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The four purposes of this study were (1) to test the long-range effects of classification training (CT) on disadvantaged black children, (2) to evaluate the effects of reintroducing CT to those previously trained, (3) to compare CT at two age periods (5 and 6 years old), and (4) to compare CT with attention training (AT). Of the 69 children used in this study, 30 had received CT the year before, and 39 had received no training (NT). CT focuses on the many attributes of objects that may be used as a basis for grouping. AT teaches the child to focus on observable attributes and to discriminate among them. The children were pretested, and 59 of them were divided into six groups: (1) CT-CT (the symbols signifying that the group received CT the previous year and the current year), (2) NT-CT, (3) CT-AT, (4) NT-AT, (5) CT-NT, and (6) NT-NT. Pretraining scores on a battery of grouping tasks indicated that the previous year's training had had a lasting effect, at least in facilitating a more flexible approach to classification in the current year. CT-CT, NT-AT, and NT-CT children showed a significant increase in grouping responses on posttests. (WD)

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Report Number
6

Modification of Cognitive Skills among Lower-Class Negro Children:

A Follow-up Training Study*

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Modification of Cognitive Skills Among Lower-Class Negro Children: A Follow-Up Training Study *

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Introduction

Our 1967-68 Head Start project was concerned with the modifiability of classification skills among lower-class black children by using training procedures that focused on decentration, the ability to shift point of view. It has been found that children increased in their ability to form classes, employed a greater variety of attributes and functions of objects in creating classes, and increased in their capability for articulating the rationale for groupings after receiving classification training. (Sigel and Olmsted, 1967).

These results, however, were based on post testing done shortly after the training period. Significant as it was to demonstrate the short-term effects of such educational experiences, the more important issue is to assess long-term effects, say a year later. Does the training, in effect, create changes in classification skills that have some enduring quality?

The proposition is that the result of short-term training should, in fact, be short-lived especially if the child is in a system of education which does nothing specific to enhance these skills.

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Consequently, it is presumptuous to expect that the one-month training program that was employed in 1966-67 would have long-term effect. However, one can reasonably assume that it might have had sufficient impact so that review or further training a year later might solidify or at least result in more rapid learning of classification skills. One can refer to this process, in effect, as "dosing". This is comparable to offering the child a booster shot. It is hypothesized that children who receive this booster treatment will do better on logical, analytic, and classification tasks than children who have not received such a booster.

Convincing as these results were, it was found in another of our studies that cognitive skills could be enhanced not only by training in classification but also by providing children with experiences in discrimination and memory tasks (Shantz and Sigel, 1967). True, these results were obtained with middle class white children. The fact that two apparently different training procedures yielded the same results on measures of children's ability to conserve mass and number led to the search for an overlap between the two training procedures which might account for the similar outcomes. Thus, the second purpose of this study is to compare these two approaches since one of the goals of our overall research program is to identify the most utilitarian and conceptually sound training procedures.

The rationale for this choice of a research problem rests on the seeming overlap between the two procedures. Before articulating the overlap, a word about each. In classification training the children are asked to identify objects and their manifold attributes, seek commonalities among the objects to build groups, and break up these groups and create new ones (See Appendix A for a description of the procedure).

Discrimination-memory training was comprised of discrimination and memory tasks. The children had to distinguish differences, seriate items on the basis of details, retain knowledge from a story, reproduce body movements of another from memory, etc. (See Shantz and Sigel, 1967, for complete description).

The commonality between classification and discrimination-memory training rests on the proposition that in each type of procedure it is necessary to pay attention to details in order to distinguish some attributes from others. Each training condition requires the child to discriminate, to scan arrays, and to see constancies and similarities among diverse objects. Since classification training and discrimination-memory training involve these types of behaviors, each can have similar effects. Hence, the lack of obtained difference in such an outcome variable as conservation was interpreted as a function of the common-denominator, the attention variable (Shantz and Sigel, 1967).

Specifically, the second purpose of this study is to determine the degree to which classification training does, if any, overlap with attention training in terms of cognitive outcomes, e.g. classification, logical, and analytic skills. Results of classification training have been reported previously with younger children (Sigel and Olmsted, 1967), but no direct comparison with attention training has been done. Since attention training includes discrimination, scanning and generalization, and since classification training appears to involve these same processes, it is hypothesized that there will be no difference between classification training and attention training in terms of their influence on logical and analytic skills. The differences to be found between classification and attention training, however, would reside in types and range of criteria used in classification tasks. Attention training teaches the child to focus on observable attributes, discriminate among diverse observable attributes, scan for them and identify them in varying contexts - thereby generalizing (See Appendix B). In classification training, however, the goal is to make the children aware of the multidimensionality of objects including consideration of inferred attributes. Further, the children are taught that any criterion is possible for creating groupings. Thus a relativistic rather than absolutistic approach is encouraged.

Since this study is in effect longitudinal, it becomes possible to assess the effects of various combinations of training. We can observe the effect of:

(a) classification training followed by attention training
(b) attention training with no previous history of classification training
(c) classification training a year ago and a booster of the same
(d) classification training a year ago with no further training
(e) classification training for the first time

The hypotheses of this study are derived from analysis of the task requirements of classification and attention. Classification training focuses on the polydimensionality of objects, and the awareness that any one or more of these attributes may be used as a criterion for grouping. The child is encouraged to decenter and shift from one attribute to another. Thus, children experiencing such training have been found to employ a wider array of criteria for grouping as compared to children not having such experience (Sigel and Olmsted, 1967).

Attention training emphasized high articulation of detail and search for common or equivalent elements varying in position or context. Where classification would encourage breadth, attention would narrow the focus. If this is the case, children receiving additional classification training would be expected to be more varied in grouping criteria and hence be more able to provide a greater variety of responses. Children receiving attention training after previous classification training would be able to create groupings by virtue of their previous training. Since, however, there is more emphasis on focusing on specifics, chances are they would show less variety than classification boosted children. Each of these procedures, however, should produce children more varied and more fluent than children who receive no further training.

The training procedures are expected to have differential effects on cognitive skills other than categorization. On the basis of previous research, classification training should induce conservation (Shantz & Sigel, 1967; Sigel, Roeper, Hooper, 1966). Assuming the logic of our description of the attentional processes, we would expect enhancement of conservation skills as a result of this training. This expectancy is partly derived from results of Shantz & Sigel (1967) and from the report of Gelman (in press). In the latter study, Gelman reports indication of conservation in five year olds because of attention to relevant cues. Training children to focus on relevant details should thereby facilitate solution to conservation tasks.

It is also expected that children receiving attention training should do better on analytic tasks as compared to classification

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trained children because the former training condition provides greater emphasis on identifying and discriminating of relevant cues. Although the classification procedure does contain discrimination experience, the emphasis is on the grouping whereas in attention training the focus is on differentiation of elements of objects. Thus, superiority of the attention group over the classification trained is expected.

As for expectancies of training on logical tasks, e.g. multiple seriation, reversibility and multiple classification, we would base our expectation on the results of the Shantz & Sigel study where these operations were interpreted as independent on the training. That study was done with middle class children. The question is: are these findings replicable with lower-class children.

The Significance of this Study: First, it would attest to some advantage for short-term training situations if children who have received such training and subsequently received a review would continue to improve. Let it not be misunderstood, this is not advocating short-term training; but apparently under the current educational set-up, opportunities for overhauling educational systems is remote.

Secondly, by following the same children over a two-year period, determination of the degree to which initial gains are retained can be made. This contributes knowledge of the reliability of our measures and speaks for the stability of performance.

A third contribution of this study rests on its comparison of attention training and classification training. The former has become of increased interest particularly since such writers as Zeaman and House (1963) have emphasized attention as a very significant variable in the learning process. Although their work has focused on mental retardates, the implication is that attention is an important function in learning in general for all populations. The degree to which the significance of attention as a factor in learning can be demonstrated, the greater becomes our understanding of the learning process.

Fourth, the opportunity to do a longitudinal training study involving two age periods provides further information on the impact of particular training periods of two different time epochs. Introducing learning through classification training with five-year olds, for example, does not necessarily speak to the feasibility of such training programs with children a year later. In this study we were able to determine the degree to which such training is, in fact, effective at each of two age levels - 5 and 6 year olds.

Finally, the opportunity to compare children whose experimental history is known on two different training procedures enables assessment of the interrelationship between the procedures.

The purposes of this study can be specified as follows:

(1) to test the long-range effects of classification training,

(2) to evaluate the effects of re-introducing classification training to those previously trained,

(3) to compare classification training at two age periods (5 and 6 year olds),

(4) to compare classification training with training in attentional processes.

Design of the Study

Sample: To accomplish the above purposes, 69 of the 72 children who were involved in the 1966-67 study were located. These included both children who were in the training program as well as those who were controls in the previous experiment. Of the 69, 39 were controls in 1966-67 and 30 received classification training.

Also the children in the 1966-67 study were identified as high scorers (at least 50% grouping responses on the Object-Picture categorization pre-test) and low scorers (less than 50% grouping responses).* Of the 69 children located, 47 were low scorers and 22 were high scorers.

These 69 children were distributed into six groups in preparation for the training programs in this study. Nine children were randomly eliminated from group 6 to equalize the size of all groups. The composition of the groups and the types of training given to each are evident from Table 1. As can be seen from that table, the six groups contain comparable proportions of high and low scorers. These six groups were formed by making all possible combinations of the two conditions (CT and NT) included in 1966-67 and the three conditions (CT, AT and NT) used in 1967-68. For example, group 1 (CT-CT) received classification training both years while group 2 (NT-CT) received no training in 1966-67 and were then given classification training in 1967-68. The remaining four groups received the other combinations of conditions and can be read in Table 1.

Insert Table 1 about here

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* The Object-Picture categorization test requires children to classify three-dimensional objects and pictures of these objects. This test is reported in detail in Sigel & Olmsted, 1967, and Sigel & McBane, 1967.

Methods and Procedures: All 69 children were given a battery of pretests (See Appendix C for details of the test battery). Then the six groups were formed and the number of children in each group made as comparable as possible. The remaining 59 children received either classification training, attention training, or no training and were post-tested.

The major criterion instruments in the 1966-67 study were the Object-Categorization Test (OCT) and Picture Categorization Test (PCT). Sigel and Olmsted (1967) have described these tests previously and they are again described in Appendix C. Two scores from this test will be used, grouping scores and style scores. Grouping responses are those which contain a meaningful relationship between all the items selected. Styles of categorization are based on the content of the verbalization provided for each grouping. The following are the categories of styles: descriptive (form, color, structure); relational-contextual and categorical-inferential (See Appendix C for details on the scoring).

A modification of the PCT was constructed for this study, the Multiple Categorization Test (MCT). In this task the child is presented with twelve pre-arranged sets of pictures. For the first six presentations the child is asked to give two reasons why the item may have been grouped. Three reasons are requested for the remaining six sets, yielding a total of 30 responses.

Other instruments in the battery were two classical Piaget conservation tasks, number and quantity; and measures of logical operations, i.e. multiple classification (matrix problems), multiple seriation and reversibility. The Peabody Picture Vocabulary Test was included as a measure of general intellectual ability while the Block Design and Geometric Design sub-tests of the Wechsler Preschool and Primary Scale of Intelligence were used as measures of analytic ability. Finally, an impulsivity control measure was administered to assess the degree to which the children would, as instructed, perform slowly as they could. Appendix C lists the tests and identifies which were used as pre and as post-tasks.

The rationale for these batteries were as follows: first, we wanted to establish the degree to which children classified objects, and the kinds of cognitive styles they used in their classification; two, these measures allow for an assessment of the degree to which children classify comparably on three-dimensional as compared to two-dimensional objects; and three, it enables us to assess the relationship between cognitive measures which is in effect partly a replication of the Shantz & Sigel (1967) study. The addition of the impulsivity measure is based on our interests in determining the degree to which attentional training, in particular, would slow down the child's performance.

Training Procedures: For the classification training groups a total of ten sessions was used distributed over a two to three week period. The description of the training program used this year is in Appendix A and also has been described previously, but for the new reader let me just briefly state that the task here is to provide the child with the opportunity to identify the various attributes of an object and use these attributes as bases for classification. He is encouraged to build and rebuild classes and to combine and recombine classes of objects. The point in this training is to acquaint the child with the multi-dimensionality of objects and to facilitate his processes of decentration. As can be seen from the curriculum guide (Appendix A) attached to this report, the teacher is encouraged to be as non-evaluative as possible and to let the child use whatever labels he desires in describing any attribute of an object. Details of the classification training given in 1966-67 can be found in Sigel and Olmsted (1967). The use of both pictures and objects in separate sessions was intended to further our work in assessing the degree to which objects and pictures are differentially classified by young children and further to determine degree to which the training program can reduce this discrepancy.

Turning now to attention training, this was a training program developed for this project and involved a series of tasks which are described in Appendix B. Here the focus was primarily on providing the children with opportunities for discrimination, for identifying sameness, difference, and degrees thereof, and for learning to analyze complex patterns.

Each of these training procedures was conducted in a group of four to seven children in a room away from the classroom by an experienced trainer, a member of our project team. The trainers had no knowledge of the children's scores on any tests. They did, however, meet with the children in the classroom to get to know them before the training began. Each trainer had a curriculum guide which they were instructed to follow as closely as possible. Tape recordings were taken of all the training sessions for two reasons: (1) to provide a monitoring effect by which the examiner could later on check his own behavior, and (2) as a check on the trainer--to be used by the project supervisors to be certain the curriculum guide was being followed.

Results and Discussion

The results of this study will be presented in two sections. The first section will report pre-test data on the OCT, PCT, and MCT. The second section will deal with the effects of the various combinations of training procedures.

Pre-Test Results

Grouping Responses: The ability to produce grouping responses approximately eight months after training is equally present for each of four groups. The medians for each of the four groups irrespective of training, mode of representation, and test condition are similar. Medians for the OCT active condition are 11 and 11.5 for the trained groups and 12 for each of the non-trained groups. For the picture, active condition the median for the high non-trained group was 11.5 while a median of 10 was obtained for the other three groups. On the passive condition for the OCT, the medians ranged from four to six as follows: LCT, 5; LNT, 4; HCT, 6; HNT, 4.5. The PCT passive condition was equally difficult for each of the groups where the medians were three for the LNT group and four for each of the remaining three groups. Thus, we can conclude that performance level is equivalent among the four groups but varies as a function of test material and test condition.

Object-Picture Discrepancy: As indicated above, the mode of representation, i.e. objects or pictures, seems to influence the quantity and quality of grouping responses. We refer to the differential between the OCT and PCT as the object-picture discrepancy. We turn now to a discussion of this discrepancy.

Table 2 contains the percentage of subjects in each group

Insert Table 2 about here

showing the various types of object-picture discrepancies. Inspection of the table reveals that discrepancies exist for both the active and passive conditions for each of the groups. However, previous training does not appear to have reduced this discrepancy in any systematic way. Except for the HNT group in the active condition, children give more grouping responses to objects than pictures. This result holds for each of the groups in the passive condition.

It is of interest to note that in the active condition relatively more children give equal number of grouping responses to objects and pictures with few reversing the trend, i.e. more grouping responses to pictures than objects.

However, in the passive condition, more grouping responses are elicited by pictures attesting to continued lack of equivalence between objects and pictures. Pictures, then, elicit more grouping responses in the passive condition than in the active one, while at the same time objects continue to elicit grouping responses. In the passive condition, therefore, equivalence of OCT and PCT is considerably less than in the active condition.

Explanation of these findings can be only speculative. The degree to which these discrepancies reflect difficulty in representational competence is still moot, since the results may be artifacts of the test materials and test conditions. For example, are equivalent responses to objects and pictures easier when the child is free to create his own grouping than when he has to respond to a pre-formed grouping? It may well be that such freedom of choice in the active condition elicits familiar criteria for grouping, while in the passive condition the child feels that he has to discover what the tester wants. This constraint might inhibit responsiveness. Does the difference in perceptual cues in the three dimensional condition evoke more familiar associations than pictures? These are but some of the issues needing study.

Styles of Categorization: Comparability of grouping performance or variation as a function of mode of representation tells us nothing about the criteria employed in constructing groups. The bases for grouping are what we shall now discuss under the rubric of styles of categorization.

First, before we turn to analysis of the number of styles employed by each of the four groups, let us recall that one of the outcomes of the classification training reported in the 1966-67 study was the fact that children trained in classification increased significantly more in the number of styles used than the non-trained group. In Table 3 are presented the percentage of children using various numbers of styles for the active and passive condition with pictures and objects. The table is self-explanatory revealing that some, but not dramatic differences exist among the groups. Some children in each group are able to employ more than one basis of grouping. Thus, we can conclude that effects of training and original grouping capability are not necessary and sufficient conditions for influencing style variability performance eight

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Insert Table 3 about here

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months later. It might be recalled that initially larger proportions of children tended to persevere and use only one style. A year later many of the children are able to use more than one basis of similarity. There still, however, is a relatively large percentage of one group (HNT) who use only one approach, e.g. 71% in the OCT active condition.

The percentage of children using each of the style categories is presented in Table 4 for the active and passive condition for each of the tests. Differences in style usage are evident between the active and passive condition for the OCT and the PCT. One most noticeable difference in the OCT active condition is that the high responders, irrespective of training, use more color responses than any other style. This is in contrast to the low responders who tend to use form equally or more so than color.

Insert Table 4 about here

The results are similar for the active PCT task. The significance of this result is difficult to assess. It depends, in part, on the interpretation and significance attributed to color and form. From our previous studies, it is not clear whether color responses reflect increased experience in school where considerable emphasis is placed on teaching of colors and color labelling, or whether it is an artifact of our task. The latter interpretation seems doubtful in view of the variability among our groups in using color responses as a basis of classification. It may well be that children motivated to respond use the more blatant and dramatic criteria--namely color. We are inclined to accept experiential and motivational interpretation for the present, at least in view of our previous results on color-form usage, where we found that children who had difficulty in verbalizing tended to use form responses (Sigel & Olmsted, 1967). Interesting is the fact that form responses are more evident among middle-class children than lower-class children (Sigel & McBane, 1967).

Of relevance to this is the fact that in OCT passive condition, a usually more difficult test, color responses are more frequently used than form. This lends support to our contention that color is easier, since it is more blatant; hence, increased frequencies in the more difficult situation. This is presented in support of our belief that familiarity and continued reinforcement of use of color labels account for the results.

Other styles used in greater proportion than before are structural, relational and categorical (Sigel & Olmsted, 1967). The increase in structural response is indeed of interest since this is interpreted as an analytic response, reflecting the ability to disengage items from an embedding context and hence reflect some independence from the environment. Further, such responses can be interpreted as indicating increased intellectual maturity (Witkin, 1962).

Employment of relational and categorical responses reflect increased capability to shift from physical attributes to a greater interest in relationships and class labelling.

It would seem that training effects wash out after an eight month period. Interestingly enough, this is not a completely accurate statement for a significant and meaningful difference does persist, and we turn now to this set of results--differences in multiple categorization.

Results of the Multiple Categorization Test: Since we discovered that all children were able to provide high frequencies of grouping responses to the original Object-Picture Categorization Test, it was concluded that the OCT and PCT were not sufficiently discriminating between the groups. It was, therefore, decided to introduce a more difficult task, the Multiple Categorization Test (See Appendix C). This test it will be recalled requires the child to give two or three responses to a pre-formed set of pictures. Twelve sets are used.

A one-way analysis of variance was done using four groups: High Scorers, Classification Trained (HCT); Low Scorers, Classification Trained (LCT); High Scorers, Non-Classification Trained (HNT); and Low Scorers, Non-Classification Trained (LNT). (See Table 5). A significant F was found for the groups (F = 6.09 p < .005).

Insert Table 5 about here

Inspection of the means and standard deviations indicates little difference between classification trained high and low scorers. Little difference was also found between the non-trained high and low scorers. Thus, the means of the two trained groups were combined and compared to the means of the two non-trained groups. A t test between these two combined groups indicates the difference is significant (t = 2.40 · p < .01). Thus, it can be concluded that groups who were trained could, upon request, provide more alternative groupings than the untrained group. *Training did have a lasting effect at least as far as facilitating a more flexible approach to classification at least when requested to do so.*

Post-Test Results

Up to this point the results of the pre-test have been reported indicating the degree to which the earlier training persisted. Let us turn now to the results of the second training series. For this discussion the reader will have to think in terms of the *six* training groups described in Table 1.

In our discussion of pre-test results, it will be recalled that an analysis was made of the OCT and PCT in terms of grouping responses. Since the median for all groups was so high for the active condition and since the Multiple Categorization Test included the passive condition, the OCT and PCT were reduced to six sets each and it was this revision that was used for the post-test.*

In view of these changes in the post-test battery and in view of the high proportion of grouping responses in the active condition, analysis of grouping responses would not provide a meaningful test of the effects of training. Rather, the results from the Multiple Categorization Test, we believe are more sensitive for assessing changes in classification skills and, therefore, will be used as a basis of examining effects of training. However, the persistent problem of Object-Picture discrepancy will be reported.

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* Correlation between this sub-set of six and the twelve item OCT was .70 for the active and .81 for the passive; for the picture-condition, the active part was .82 and the passive was .76.

Object-Picture Discrepancy: We have previously reported that children tended to categorize objects and pictures differently--as if treating each as a separate class of stimuli. After training there is a noticeable shift for the active and passive condition. Table 6 shows the changes - greater commonality in dealing with pictures and objects but also a tendency for the discrepancy to persist, now favoring pictures. This lack of equivalence raises the questions posed earlier, since no systematic changes are found as a function of training groups. Rather than venture speculation, there is need to examine this question further empirically. First, there is need to assess the groups. Sigel reported no discrepancy with older middle-class children (age 7) (Sigel, 1953). On this basis one might ask if using older children might not yield results different from those obtained here. Secondly, it may well be that lower-class Negro children have difficulty in the representational area and a more direct frontal research attack is still needed. All that can be concluded at this point is that more research is necessary.

Insert Table 6 about here

Let us now move on to the Multiple Categorization Test (MCT).

Multiple Categorization Test: This task, it will be recalled, formed part of the pre-test battery. In that pre-test condition, the children who were trained a year earlier differed significantly in their ability to give multiple reasons for a grouping from those who were not trained.

Thus, in examining post-test results for each of the six experimental groups, it must be kept in mind that the 3 CT groups (as of 1966-67) did begin with an advantage. To cope with this bias, we compared pre and post gains for each of the groups separately--in effect using each group as its own control. With such analysis for each of the six groups we can focus on the gains for each group.

In Table 7, the pre and post-test scores and change scores are

Insert Table 7 about here

presented. From the table it can be seen that the NT-CT group made the greatest gains in absolute terms followed closely by the CT-CT group; the NT-AT group was far below the above two. The remaining groups made relatively little gain. The group that had classification training in 1966-67 and in 1967-68 received attention training showed very little change, no different from the control group. Another group that changed virtually not at all was the CT-NT group.

In effect, these results show that in the pre-test condition--eight months after the last contacts with the children, CT groups did better than non-CT groups. Dosing or introduction of classification training does facilitate the ability of children to produce several responses to a single set of objects. This is a confirmation of our hypothesis that reintroduction of classification training influences the ability of children to function more flexibly.

The imposition of attention training (AT) on classification training (CT) yielded no significant gain. This finding is interpreted as a function of the possible redundancy of AT in the context of previous CT experience, adding little to classificatory skill. Thus in that respect, AT training contributes no more than no training. It will be recalled that AT preceded by no training did lead to gains in multiple classification.

Thus, we might conclude that there is a "plus" factor in classification training that enhances the capability of the child to shift his focus--that he decenters more readily than children attention trained. Our data also demonstrates that for most effective change in classification training, one of the following two conditions is necessary for maximal gain: classification retraining or the most recent classification training; and second, attention training not preceded by classification training.

If review is not instituted, children do not show further gain. However, they do not lose what they have previously gained.

As was noted previously, the addition of attention training experience in the context of classification training experience contributes little to the child's comprehension of grouping. When AT is used alone, it does help focus the child on commonalities which is a necessity for classification. But the magnitude of the contribution is limited.

The MCT responses also allow for analysis of number of styles of categorization used as well as type of styles employed. Each of these sets of results will now be discussed.

Table 8 presents the results of the change in number of styles

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Insert Table 8 about here

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used. From Table 8 it is evident that the groups who received classification training once within the time confines of this study, 1966-67 or 1967-68, tended to produce more alternative ways of grouping than those who have never received any classification training. Sixty-nine percent of the children receiving classification training used more than three criteria for building classes as compared to 30% for the non-trained group.

This is the state of affairs prior to the second round of training but of significance of itself. It does show one type of long-term gain.

The groups that produce the highest percentage of 3 or more responses are those who received classification training during this year or last (CT-CT, NT-CT, CT-NT). The NT-AT and one CT-AT group ranked next with 60 and 55% of the children respectively using more than three grouping responses. The group receiving no training was equally divided 50% less than 3; 50% more than 3.

It is of interest to note that for most groups there was a tendency to increase in the number of styles used. No doubt experience in school and increased skill in verbalizations influence all groups, e.g. the group not trained in either year showed an increase of 40% of the children providing 3 or more styles. The significant index of change is the percentage of children who gave 2 or less styles. The fact that the groups who received only CT experience a year ago still maintained their capability of using varied styles attests to the potency of this type of training. This is particularly the case when one examines the effects of AT, either alone or subsequent to CT. In both cases AT negatively influences openness of classification.

Further support for the "narrowing" effect of attention training as well as the potency of classification training as a review or a new experience can be seen from inspection of individual changes depicted on Table 8. It is interesting to note that only for the CT-CT and NT-CT groups, not a single child decreased in the number of styles used, whereas some such decreases are found for each of the other groups. Note the particularly large number of children decreasing in the CT-AT group.

Thus, it can be concluded that the stable long-term result of classification training is the continued ability to utilize a variety of classification approaches.

Table 9 contains the percentages of children using the various style categories, i.e. form, color, structure, relational and categorical. As can be noted from that table, changes in styles appear for each group but these changes are not systematic. This may well be due to the fact that neither of our training programs emphasizes any particular style, rather a variety of criteria was accepted, thereby allowing the children to employ their own preferences. What these results may represent is, in fact, an increased opportunity and "know-how" for children to express their own preferences in grouping responses as well as increase their repertoire of responses. The fact that color responses, in particular, persist does raise a question of the maturity level of these children since it was found that privileged children tend to decrease in their use of color at age six (Bearlson & Sigel, in press). Aside from this,

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Insert Table 9 about here

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our results do indicate capability of the children to group and perhaps to have attained increased understanding of the methodology of classification and flexibility in chosing criteria.

Analytic Ability and Verbal IQ: Two tasks were included as measures of analytic ability--the Block Design and the Geometric Design, sub-tests of the Wechsler Preschool and Primary Scale of Intelligence (WPPSI). The IQ measure used was the Peabody Picture Vocabulary Test.

The results of the post-testing showed that all groups increased significantly irrespective of training status in Block Design Test performance. Apparently just increasing age and consequent experience seems to make for the difference.

Turning now to the Geometric Design Task, we find that those groups receiving training of either type in 1967-68 regardless of previous training showed a significant increase. The two groups not trained this year showed no significant change (See Table 10).

Insert Table 10 about here

It was hypothesized that the AT groups should do significantly better than the CT groups since the former focused on detail and analysis more systematically than the latter. Obviously, our hypothesis was not substantiated. These results may be further evidence of the overlap between classification training and attention training discussed earlier.

Peabody Picture Vocabulary Test reveals no difference among each of the six groups. Since this test was administered only as a post-test, we cannot assess whether gains were made. But it is of considerable interest to note that differences among the groups in their other cognitive abilities cannot be attributed to differences in IQ. (See Table 11).

Insert Table 11 about here

Impulsivity: It was hypothesized that AT would influence impulse control more than CT since AT contains training in scanning which is assumed to require delay in responding. CT also encourages scanning behavior but does not articulate such behaviors as a prerequisite to responding.

The results are presented in Table 12 separately for trials 1 and 2. As can be noted in Appendix C, two trials are used in order to assure reliability. However, it was found that there was only a moderate correlation for performance on the two trials. The correlation between trials for the groups trained in 1966-67 was .27 (N.S.) for the non-trained was .72 ($p < .01$). This lack of consistency was surprising since middle-class children tend to be highly consistent from trial 1 to trial 2 ($r = .89$, Sigel, unpublished data).

Insert Table 12 about here

The lack of relationship between the two trials may be due to a variety of factors, e.g. the child's comprehension of the task, willingness, and ability to comply. Consequently, pre-post measures were done separately for each trial. Using separate analysis for each trial and comparing such results would allow for examination of consistency.

In Table 12, the pre-post results are presented for each trial

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Insert Table 12 about here

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showing where increase in impulse control was found. Significant changes are found for Trial 1, for NT-CT, NT-AT, the two groups trained only this year. This result tends to be a rejection of the hypothesis that AT would be superior. In Trial 2, significant changes are found for these two groups and, in addition, for the CT-CT group. Thus, particular training does not seem to have any effect.

We continue to be perplexed by the CT-AT results since at least for this measure there is every reason to expect significant changes which are not found. Whether this is a function of a sampling error or is a reflection of the redundency rationale discussed earlier, is hard to say. Of course, there is the chance that in this case the results are a function of AT cancelling out CT experience by making a contradiction and hence conflict in the child. This conflict between the openness of CT experience followed by the closedness of AT training may well have immobilized him. Once again, further study of this issue is needed.

Logical Operations: Each child, it will be recalled received three Piagetian type tasks of logical operations, i.e. multiple classification, multiple seriation, and reversibility.

The issue here is whether either of these training procedures would have systematic effects on the children's performance on these cognitive tasks. This is, in effect, a replication in part of the Shantz & Sigel study (1967). Inspection of Table 13 reveals

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Insert Table 13 about here

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that overall, the training is not effective in improving these skills. These results are consistent with those found by Shantz & Sigel (1967).

The performance of the children on each of these tasks is not consistent. Success on pre-test does not necessarily predict the success on post-testing. Whether this instability is due to the unreliability of the measure or the tentativeness with which these children deal with these type problems is a moot question.

Of all the tasks, reversibility was the easiest--with 61% of all children passing in both pre and post in contrast to 8.5% and 5.1% passing multiple seriation and multiple classification respectively. In fact, multiple classification and multiple seriation appear to be of equal difficulty (67.8% fail both pre and post multiple classification and 61% fail both pre and post multiple seriation). Changes from pre to post are highest for reversibility, 23.7%, whereas for the other two operations 16.9% of the children change. Percentages increasing or decreasing in the success for each of these two operations are virtually equal. Since no systematic change is observable, it is impossible to attribute specific effects to one training program.

These results then with lower-class Negro children are consistent with the Shantz and Sigel results as far as change in performance on multiple seriation and multiple classification are concerned. The difference between these two studies is in the percentage of children able to cope with these tasks.

In the Shantz & Sigel study of middle-class 5 year olds many were able to solve each of these problems--while for this population the performance is considerably inferior. It can be concluded that the training in attention and in classification does not have any direct effect on reversibility, matrix-type classification problems, and seriation.

Effects of Training in Conservation: It was hypothesized that classification and attention training would have equal effects in facilitating solution of conservation problems.

Table 14 presents the results of performance on the conservation tasks. On the pre-test only 8.5% of the children could conserve number and 1.7% could conserve quantity. These results are not very dramatic, when it is noted that 81.3% could not conserve number and 93.2% could not conserve quantity either before or after training. These results cannot be attributed to a lack of understanding of concept like more, same, or less since tests for this were administered. (See Appendix C for the Primary Pre-Test). All children passed this test.

Insert Table 14 about here

Where change, and this is certainly minimal, did occur, it was for groups receiving attention training. It may well be that aiding children in attending might facilitate acquisition of conservation, but perhaps longer training is needed.

It is important to point out that the difficulties these first-grade children have (both at the beginning and at the end of first grade) in not being able to conserve number and/or mass, reveals the seriousness of their cognitive deficit, especially if the criterion used is our data from middle-class whites. It is worth pointing out that among 5 year old white middle-class children, conservation of number and mass are soluble. Of the 75 children tested in the Shantz & Sigel study, approximately 50% could conserve in these areas without training and after a nine-session training program, 68% of the previous non-conservers could then conserve. For the lower-class population, however, the situation is dramatically different; very few conservers are found at age 6.

Summary of Conclusions

The purposes of this study were: (1) to examine the effects of classification skills a year after a one-month training program was completed; (2) to assess the effects of re-introducing classification training as compared to introducing training in discrimination, scanning, and generalization; (3) to test the efficiency of classification training at two age levels. The dependent variables are categorization skills, IQ, analytic skills, logical operations (multiple seriation, reversibility, multiple classification), and conservation. The rationale for expecting the training to have differential effects is based on previous studies (Shantz & Sigel, 1967; Sigel & Olmsted, 1967; Sigel, Roeper, Hooper, 1967).

Children involved in the 1966-67 program were identified and of the original group 69 were found and pre-tested; then 59 of these were placed in one of six groups, thereby providing for control and experimental groups. Assignments were made on the basis of previous roles in the 1966-67 study so that adequate representation for each of the necessary conditions was possible.

Training sessions in classification and in attention were developed--a total of ten sessions for each type of training.

As for pre-test results, (1) all children irrespective of training continued to show discrepancy in responses to objects and pictures; (2) children having had previous training in classification did not differ from their controls eight months later in giving single grouping responses; (3) children having been trained, however, were superior to the controls in being able to produce multiple responses when instructed to do so; (4) trained children were more able to use more varied criteria in classification.

Post-training results showed: (1) children receiving booster classification training showed a significant increase in grouping responses as did children receiving classification and attention training for the first time, while the remaining three groups showed no significant change in group responses; (2) all new training did affect analytic performance as measured by the Geometric Design Test (WPPSI). (3) new training regardless of type did seem to increase impulse control (motor inhibition); (4) training did not affect performance in logical operation and conservation.

Conclusions and Implications

The results of this study demonstrate the value of classification training vis-a-vis subsequent classification behavior. However, contrary to expectation, such achievements did not have the transfer effects predicted.

The effectiveness of this training is, however, not just on the contemporary scene, but also has some long-term effect. It is interesting to have found some long-term gains in spite of the short-term training periods in 1966-67 and in spite of the fact that there is little likelihood of the first-grade experience reinforcing the training. One wonders what might have happened had the school curriculum incorporated our training program and built upon it.

From the theoretical point of view many unresolved issues remain, e.g. the Object-Picture discrepancy, the difficulty in conservation, etc. Why these phenomena exist will have to await further study. At least as far as is known now, these lower-class Negro children do show different patterns of cognitive functioning than their middle-class counterparts. There is still need to map out the cognitive functions of these children to ascertain the similarities and differences with their privileged peers. This is on the assumption, of course, that privileged status yields, in general terms, more efficient and effective cognitive behavior. Thus, why did classification training have no effect on conservation for children in this study when it has been shown on three different occasions with middle-class children that this is the case. The children in this study have IQ's which are in the low "normal" end of the distribution and should, therefore, have made the necessary gains--assuming IQ is relevant of course.

The considerable variability of these children indicate that they are not of the same cloth in spite of commonality in economic and social position. There is much to be done in deepening our knowledge of them, and we have but scratched the surface.

In sum, we believe that the training programs do have educational heuristic value. At the same time, however, we must not feel smug, rather there is much research to be done identifying in more specific terms the causative basis for the kind of cognitive behavior we found. Armed with such data and given increased flexibility of public schools in incorporating the new knowledge, the cognitive competence necessary for maximizing educational opportunities can be brought about. The joint efforts of research and educational practice are, in our examination, the necessary and sufficient conditions needed to create the long overdue change in educational level of impoverished children.

References

Bearison, David J., & Sigel, I. E. Study of hierarchical attributes for categorization. Journal of Perceptual and Motor Skills, 1968, 27 (in press).

Gelman, R. Conservation acquisition: A problem of learning to attend to relevant attributes. Journal of Experimental Child Psychology, 1968, (in press).

Shantz, Carolyn U., & Sigel, I. E. Logical operations and concepts of conservation in children: A training study. OE Report, Project No. 6-8463, June, 1967.

Sigel, I. E. Developmental trends in the abstraction ability of children. Child Development, 1953, 24 (2), 131-144.

Sigel, I. E., & McBane, Bonnie Cognitive competence and level of symbolization among five-year-old children. In J. Hellmuth (Ed.) The disadvantaged child, Vol. 1. Seattle, Washington: Special Child Publications, 1967, 435-453.

Sigel, I. E., & Olmsted, Patricia Styles of categorization among lower-class kindergarten children. Paper presented at the American Educational Research Association Annual Meeting, New York, New York, 1967.

Sigel, I. E., Roeper, Annemarie, & Hooper, F. H. A training procedure for acquisition of Piaget's conservation of quantity: A pilot study and its replication. British Journal of Educational Psychology, 1966, 36, 301-311.

Witkin, H. A., Dyk, R. B., Faterson, H. F., Goodenough, D. R., & Karp, S. A. Psychological differentiation. New York: Wiley, 1962.

Zeaman, D., & House, B. J. An attention theory of retardate discrimination learning. In N. R. Ellis (Ed.), Handbook of Mental Deficiency. New York: McGraw-Hill, 1963, 159-223.

Table 1

Composition of and Training Given in Each Experimental Condition

1967-68	1966-67 Group				
Group	LCT	LNT	HCT	HNT	Total
+ CT-CT	6	-	3	-	9
NT-CT	-	6	-	4	10
CT-AT	7	-	4	-	11
NT-AT	-	6	-	4	10
CT-NT	9	-	1	-	10*
NT-NT	-	13	-	6	19**
Total	22	25	8	14	69

L = Low Responder
H = High Responder

CT = Classification Training
AT = Attention Training
NT = No Training

[+] Note: First abbreviation refers to 1966-67 training and the second abbreviation refers to 1967-68 training.

* One S (LCT) lost when family moved out of Detroit.

** Size of this group randomly reduced to be comparable to other groups. New composition = 6 LNT and 4 HNT.

Table 2

Percentage of Subjects per Group Showing Each Type of Discrepancy between Number of Grouping Responses Given on the Pre-test OCT and PCT

ACTIVE

	Direction of Discrepancy			
Group	OCT>PCT	OCT=PCT	OCT<PCT	N
LCT	45	36	18	22
LNT	76	24	0	25
HCT	63	25	12	8
HNT	36	57	7	14

PASSIVE

	Direction of Discrepancy			
Group	OCT>PCT	OCT=PCT	OCT<PCT	N
LCT	55	18	27	22
LNT	48	16	36	25
HCT	50	12	38	8
HNT	50	14	36	14

Table 3

PERCENTAGE OF SUBJECTS IN EACH GROUP USING DIFFERENT NUMBERS OF STYLES OF CATEGORIZATION FOR EACH CONDITION OF EACH TEST

Object-Active

	n	0	1	2	3	4	5
LCT	(22)	-	50	27	9	14	-
LNT	(25)	-	48	36	16	-	-
HCT	(8)	-	50	38	12	-	-
HNT	(14)	-	71	14	14	-	-

Picture-Active

	n	0	1	2	3	4	5
LCT	(22)	4	50	23	23	-	-
LNT	(25)	4	44	40	12	-	-
HCT	(8)	-	50	38	-	12	-
HNT	(14)	-	64	14	21	-	-

Object-Passive

	n	0	1	2	3	4	5
LCT	(22)	9	32	32	18	9	-
LNT	(25)	8	38	36	16	4	-
HCT	(8)	-	25	50	25	-	-
HNT	(14)	-	64	29	7	-	-

Picture-Passive

	n	0	1	2	3	4	5
LCT	(22)	-	50	27	18	5	-
LNT	(25)	-	60	24	12	4	-
HCT	(8)	-	50	25	25	-	-
HNT	(14)	-	50	36	14	-	-

Table 4

PERCENTAGE OF SUBJECTS PER GROUP USING EACH STYLE CATEGORY ON THE PRE-TEST OCT AND PCT FOR ACTIVE AND PASSIVE CONDITIONS

	OCT Active Group				PCT Active Group			
Style	LCT	LNT	HCT	HNT	LCT	LNT	HCT	HNT
Form	55	40	38	29	55	40	25	29
Color	27	40	75	64	27	44	62	64
Structure	23	24	12	7	27	20	25	21
Relational	32	36	25	21	23	32	25	21
Categorical	50	28	12	21	36	24	38	21

	OCT Passive Group				PCT Passive Group			
Style	LCT	LNT	HCT	HNT	LCT	LNT	HCT	HNT
Form	41	44	12	21	41	40	12	29
Color	59	40	100	64	59	44	62	64
Structure	23	8	12	14	14	8	-	14
Relational	27	36	38	14	32	36	38	29
Categorical	36	44	38	29	32	40	62	29

Table 5

MEANS AND STANDARD DEVIATIONS OF GROUPING RESPONSES FOR THE PRE-TEST MULTIPLE CATEGORIZATION TEST FOR EACH GROUP

Group	N	$\bar{X}$	SD
LCT	22	12.4	4.8
LNT	25	8.2	5.0
HCT	8	16.5	6.1
HNT	14	9.5	6.0

ANALYSIS OF VARIANCE OF GROUPING RESPONSES ON THE MULTIPLE CATEGORIZATION TEST

Source	df	MS	F	p
Groups	3	168.1	6.09	$< .005$
Error	65	27.6		

Table 6

PERCENTAGE OF SUBJECTS PER GROUP SHOWING EACH TYPE OF DISCREPANCY BETWEEN NUMBER OF GROUPING RESPONSES GIVEN ON EACH CONDITION OF THE PRE- AND POST-TEST OCT AND PCT *

PRE-TEST

	Active			Passive		
	Direction of Discrepancy			Direction of Discrepancy		
Group	OCT>PCT	OCT=PCT	OCT<PCT	OCT>PCT	OCT=PCT	OCT<PCT
CT-CT	33	33	33	44	22	33
NT-CT	60	30	10	60	20	20
CT-AT	55	27	18	46	27	27
NT-AT	50	50	-	40	40	20
CT-NT	33	56	11	33	44	22
NT-NT	30	70	-	50	30	20

POST-TEST

	Active			Passive		
	Direction of Discrepancy			Direction of Discrepancy		
Group	OCT>PCT	OCT=PCT	OCT<PCT	OCT>PCT	OCT=PCT	OCT<PCT
CT-CT	11	67	22	44	33	22
NT-CT	30	50	20	30	50	20
CT-AT	9	46	46	18	46	36
NT-AT	40	50	10	60	40	-
CT-NT	22	78	-	22	56	22
NT-NT	20	40	40	40	20	40

* The pre-test data in this table include only those test items used in the short form of the OCT and PCT.

Table 7

MEANS AND STANDARD DEVIATIONS OF GROUPING RESPONSES FOR THE PRE-TEST, POST-TEST, AND PRE-POST-TEST CHANGE FOR THE SUBJECTS IN EACH GROUP ON THE MULTIPLE CATEGORIZATION TEST

Group	N	Pre-Test $\overline{X}$	Pre-Test SD	Post-Test $\overline{X}$	Post-Test SD	Pre-Post-Test Change $\overline{X}$	Pre-Post-Test Change SD
CT-CT	9	13.1	4.7	18.9	6.3	5.8	3.6
NT-CT	10	8.2	4.1	14.7	6.4	6.5	4.3
CT-AT	11	13.2	5.3	14.4	5.8	1.3	4.4
NT-AT	10	7.6	6.7	11.5	8.2	3.9	4.8
CT-NT	9	14.1	6.8	14.7	6.9	0.6	5.2
NT-NT	10	10.3	5.2	11.8	4.4	1.5	4.0

t VALUES OF PRE-POST-TEST CHANGE FOR EACH GROUP

Group	*t*	*p*
CT CT	4.9	< .001
NT-CT	4.7	< .001
CT-AT	1.0	N.S.
NT-AT	2.6	< .025
CT-NT	0.4	N.S.
NT-NT	1.2	N.S.

Table 8

PERCENTAGE OF SUBJECTS IN EACH GROUP USING DIFFERENT NUMBERS OF STYLES OF CATEGORIZATION ON THE PRE- AND POST-MULTIPLE CATEGORIZATION TEST

	Pre-Test						Post-Test					
	Number of Styles Used						Number of Styles Used					
Group	0	1	2	3	4	5	0	1	2	3	4	5
CT-CT	-	11	22	56	11	-	-	-	-	56	22	22
NT-CT	-	20	30	50	-	-	-	10	10	40	30	10
CT-AT	-	18	9	27	27	18	-	-	46	18	36	-
NT-AT	20	10	40	10	10	10	10	-	30	30	10	20
CT-NT	-	-	33	11	44	11	-	-	22	33	22	22
NT-NT	-	50	40	10	-	-	-	40	10	40	-	10

	Number of Styles Used			
	Pre		Post	
Group	0-2	3-5	0-2	3-5
CT-CT	33	67	-	100
NT-CT	50	50	20	80
CT-AT	27	73	45	55
NT-AT	70	30	40	60
CT-NT	33	67	22	78
NT-NT	90	10	50	50

PERCENTAGE OF SUBJECTS IN EACH GROUP INCREASING, DECREASING, OR SHOWING NO CHANGE IN THE NUMBER OF STYLES USED FROM PRE-TEST TO POST-TEST MCT

Group	Increase	No Change	Decrease
CT-CT	67	33	-
NT-CT	50	50	-
CT-AT	27	18	55
NT-AT	60	20	20
CT-NT	44	22	33
NT-NT	50	30	20

Table 9

PERCENTAGE OF SUBJECTS PER GROUP USING EACH STYLE CATEGORY ON THE PRE-TEST AND POST-TEST MULTIPLE CATEGORIZATION TEST

Pre-Test Group

Style	CT-CT	NT-CT	CT-AT	NT-AT	CT-NT	NT-NT
Form	33	50	55	50	44	20
Color	67	40	82	40	67	60
Structure	44	40	64	20	33	20
Relational	33	40	55	40	100	30
Categorical	89	60	73	60	89	30

Post-Test Group

Style	CT-CT	NT-CT	CT-AT	NT-AT	CT-NT	NT-NT
Form	67	50	36	40	67	40
Color	89	70	91	70	78	80
Structure	56	60	73	50	56	20
Relational	67	90	36	60	56	40
Categorical	89	50	64	70	89	50

Change

Style	CT-CT	NT-CT	CT-AT	NT-AT	CT-NT	NT-NT
Form	+34	-	-19	-10	+23	+20
Color	+22	+30	+ 9	+30	+11	+20
Structure	+12	+20	+ 9	+30	+23	-
Relational	+34	+50	+18	+20	+44	+10
Categorical	-	-10	- 9	+10	-	+20

Table 10

MEANS AND STANDARD DEVIATIONS OF RAW SCORES FOR PRE-TEST, POST-TEST, AND PRE-POST-TEST CHANGE FOR THE SUBJECTS IN EACH GROUP ON GEOMETRIC DESIGN TEST *

		Pre-Test		Post-Test		Pre-Post-Test Change	
Group	N	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD
CT-CT	9	9.4	5.5	15.9	4.9	6.5	3.8
NT-CT	10	11.9	4.0	16.8	4.1	4.9	5.4
CT-AT	11	10.5	2.8	15.1	3.3	4.6	3.6
NT-AT	10	13.7	6.1	17.8	4.1	4.1	4.3
CT-NT	9	14.8	4.8	14.3	4.6	-0.5	5.3
NT-NT	10	13.8	6.2	14.7	5.4	0.9	3.3

t VALUES OF PRE-POST-TEST CHANGE FOR EACH GROUP

Group	t	p
CT-CT	4.98	< .001
NT-CT	2.86	< .01
CT-AT	4.18	< .001
NT-AT	3.03	< .01
CT-NT	0.25	N.S.
NT-NT	0.87	N.S.

* Raw scores were used in the analysis as the ages of the subjects at the time of post-testing were not covered in the scaled score conversion charts given in the WPPSI manual.

Table 11

MEANS AND STANDARD DEVIATIONS OF INTELLIGENCE QUOTIENTS ON THE PEABODY PICTURE VOCABULARY TEST FOR EACH EXPERIMENTAL CONDITION

Group	N	$\bar{X}$	SD
CT-CT	9	84.8	8.8
NT-CT	10	86.1	8.2
CT-AT	11	89.6	10.2
NT-AT	10	90.3	8.9
CT-NT	9	88.0	13.3
NT-NT	10	82.4	11.1

Table 12

MEANS AND STANDARD DEVIATIONS OF LOG TIME FOR EACH TRIAL OF THE PRE-TEST AND POST-TEST IMPULSIVITY TEST FOR EACH GROUP

Group	Pre-Test Trial 1 $\bar{X}$	Pre-Test Trial 1 SD	Pre-Test Trial 2 $\bar{X}$	Pre-Test Trial 2 SD	Post-Test Trial 1 $\bar{X}$	Post-Test Trial 1 SD	Post-Test Trial 2 $\bar{X}$	Post-Test Trial 2 SD
CT-CT	1.32	0.29	1.26	0.30	1.44	0.24	1.40	0.26
NT-CT	1.16	0.32	1.16	0.25	1.38	0.29	1.36	0.22
CT-AT	1.14	0.29	1.24	0.28	1.08	0.34	1.19	0.52
NT-AT	1.12	0.22	1.09	0.25	1.33	0.19	1.35	0.28
CT-NT	1.08	0.24	1.01	0.28	1.19	0.31	1.02	0.30
NT-NT	1.14	0.20	1.19	0.35	1.09	0.28	1.09	0.31

t VALUES OF CHANGE BETWEEN PRE-TEST AND POST-TEST FOR TRIAL 1 AND TRIAL 2

Group	Trial 1 t	Trial 1 p	Trial 2 t	Trial 2 p
CT-CT	1.68	N.S.	2.14	$< .05$
NT-CT	2.14	$< .05$	4.14	$< .005$
CT-AT	-1.00	N.S.	-0.38	N.S.
NT-AT	2.74	$< .025$	3.40	$< .005$
CT-NT	1.24	N.S.	0.10	N.S.
NT-NT	-0.76	N.S.	-0.62	N.S.

Table 13

DISTRIBUTION OF THE SUBJECTS IN EACH EXPERIMENTAL CONDITION ON THE LOGICAL OPERATIONS FOR PRE- AND POST-TESTING

MULTIPLE CLASSIFICATION

Tests	Group						Total		
Passed	CT-CT	NT-CT	CT-AT	NT-AT	CT-NT	NT-NT	N	%	
Neither	7	6	9	6	4	8	40	67.8	
Pre-Test only	1	2	2	-	-	1	6	10.2	-Δ
Post-Test only	-	2	-	4	4	-	10	16.9	+Δ
Both	1	-	-	-	1	1	3	5.1	No Δ
Total	9	10	11	10	9	10	59	100.0	
Net Change Pre-Test to Post-Test	-1	-	-2	+4	+4	-1	+4		

MULTIPLE SERIATION

Tests	Group						Total		
Passed	CT-CT	NT-CT	CT-AT	NT-AT	CT-NT	NT-NT	N	%	
Neither	8	5	9	3	5	6	36	61.0	
Pre-Test only	-	2	2	2	2	-	8	13.6	-Δ
Post-Test only	1	1	-	4	1	3	10	16.9	+Δ
Both	-	2	-	1	1	1	5	8.5	No Δ
Total	9	10	11	10	9	10	59	100.0	
Net Change Pre-Test to Post-Test	+1	-1	-2	+2	-1	+2	+1		

(Continued)

Table 13 (continued)

REVERSIBILITY

Tests Passed	Group						Total		
	CT-CT	NT-CT	CT-AT	NT-AT	CT-NT	NT-NT	N	%	
Neither	1	-	3	-	-	1	5	8.5	
Pre-Test only	1	-	-	2	1	-	4	6.8	-Δ
Post-Test only	1	5	1	2	2	3	14	23.7	+Δ
Both	6	5	7	6	6	6	36	61.0	No Δ
Total	9	10	11	10	9	10	59	100.0	
Net Change Pre-Test to Post-Test	-	+5	+1	-	+1	+3	+10		

Table 14

DISTRIBUTION OF THE SUBJECTS IN EACH EXPERIMENTAL CONDITION ON THE CONSERVATION TASKS FOR PRE- AND POST-TESTING *

NUMBER CONSERVATION

Tests	Group						Total		
Passed	CT-CT	NT-CT	CT-AT	NT-AT	CT-NT	NT-NT	N	%	
Neither	8	9	9	6	9	7	48	81.3	
Pre-Test only	1	-	1	-	-	2	4	6.8	-Δ
Post-Test only	-	1	1	3	-	1	6	10.2	+Δ
Both	-	-	-	1	-	-	1	1.7	No Δ
Total	9	10	11	10	9	10	59	100.0	
Net Change Pre-Test to Post-Test	-1	+1	-	+3	-	-1	+2		

QUANTITY CONSERVATION

Tests	Group						Total		
Passed	CT-CT	NT-CT	CT-AT	NT-AT	CT-NT	NT-NT	N	%	
Neither	9	10	11	6	9	10	55	93.2	
Pre-Test only	-	-	-	1	-	-	1	1.7	-Δ
Post-Test only	-	-	-	3	-	-	3	5.1	+Δ
Both	-	-	-	-	-	-	-	-	No Δ
Total	9	10	11	10	9	10	59	100.0	
Net Change Pre-Test to Post-Test	-	-	-	+2	-	-	+2		

* The total number of children passing the number conservation pre-test is obtained by combining the number passing the pre-test only and the number passing both pre-test and post-test. (4 + 1 = 5 or 6.8% + 1.7% = 8.5%) This same procedure should be followed in comparable situations.

APPENDIX A

CATEGORIZATION TRAINING PROCEDURES

SESSION I

MATERIALS: Red and yellow large circles, squares and triangles
Red and yellow small circles and squares.

GENERAL PROCEDURE:

1. Sorting 4 pieces of cardboard two ways

   a. Introduce large red and large yellow circles and squares individually, discussing the attributes of each (i.e. color and form) with all of the children.

   b. Ask Child #1 to put the pieces of cardboard (all four) into two piles. Each pile must be the *same* in *one* way.

   c. Ask Child #2 to give the reason for the first sort. (This may be in the form of a dialogue between the two children.)

   d. Ask Child #3 to put the pieces into two piles a *different* way, so that each pile is still the *same* in *one* way.

   e. Ask Child #4 to state why these piles are the same.

   f. Review the two sorts by asking the children to recall the ways in which the piles were the same.

2. Sorting 6 pieces of cardboard three ways

   a. Introduce large red and yellow triangles along with pieces from the first sort. Point out the straight edges and corners on the squares and triangles.

   b. Ask Child #2 to make a sort into 2 piles, have Child #1 explain. Repeat with all three sorts using different children to sort and explain.

   c. Possible sorts:

      1) color - 2 piles

      2) form - 3 piles

      3) form - 2 piles - corners or straight edges vs. circles.

3. Sorting 8 pieces of cardboard three ways - 1 dimension

   a. Introduce red and yellow, large and small circles and squares *without* discussing the new dimension of size.

b. Ask a child to make a sort on one dimension using all of the pieces and making 2 piles. Have another child explain. Repeat for all possible sorts.

c. Possible sorts

1) color - 2 piles

2) form - 2 piles

3) size - 2 piles

d. Have a short discussion with all of the children concerning size.

e. Review the sorts by having the children recall.

4. Sorting 8 pieces of cardboard 3 ways - 2 dimensions

a. Use the same pieces as in Sort 3.

b. Ask a child to make a sort on a multidimensional basis using all of the pieces but putting them into 4 piles so that each pile is the same in two ways.

c. Ask another child to explain the reason for the sort. Repeat with different children until all of the sorts have been made.

d. Possible sorts

1) color and size

2) size and form

3) color and form

e. Short review.

5. Sorting 4 pieces of cardboard 3 ways

a. Introduce large, red circle; large, yellow square; small, red square; and small, yellow circle.

b. Ask a child to sort all of the pieces into 2 piles (one dimensional basis) so that each pile is the same.

c. Have another child explain the sort. Repeat with different children until all the sorts have been made.

d. Possible sorts

1) color - L,R ○ and S,R □ ; L,Y □ and S,Y ○ - 2 piles

2) form - L,Y □ and S,R □ ; L,R ○ and S,Y ○ - 2 piles

3) size - L,R ○ and L,Y □ ; S,R □ and S,Y ○ - 2 piles

e. If children only sort 2 ways, review the three attributes by recall and show them the two that they have used. Try to have the children figure out the missing sort by asking them to recall the ways they have sorted before.

SESSION 2

MATERIALS: Pair of shoes, shirt, tie, pair of gloves, watch, belt, socks

GENERAL PROCEDURE: (avoid straight descriptive responses as much as possible)

1. Present shirt
   - a. Identify - "Tell me about this."

1) What can we do with it?	(Wear it)
2) What is it made of?	(Cloth)
3) Where does it come from?	(Store)
4) Who uses this?	(Boy or girl)

   - b. Compare it with shirts of the subjects noting similarities and differences.
   - c. Class label of Clothing
     - 1) I have a new word for things like shirts that you wear. It's CLOTHING.
     - 2) Have children repeat the word.
     - 3) Clothing, now what does it mean?
2. Present tie
   - a. Identify with open-ended question used above.
   - b. Compare shirt and tie. (Note: Do not use color.)
     - 1) Both cloth
     - 2) Wear both of them
     - 3) Both for boys
     - 4) Buy both of them in a store
     - 5) Wear on what part of the body
   - c. Establish that they are both pieces of clothing but at the same time, they are different kinds.
3. Present watch
   - a. Identify with open-ended question.
   - b. Compare same as above.
4. Present belt
   - a. Identify
   - b. Compare

5. Present sock
    - a. Identify
    - b. Compare
6. Present shoe
    - a. and b. Same as above
    - c. Introduce second shoe
        1) Note similar attributes
        2) Note differences - one is left and one is right
7. Present glove
    - a. thru c. Same as above.
8. Make Groupings
    - a. Leather vs. cloth
    - b. Metal vs nonmetal
    - c. Things you wear on your feet vs. things you wear on your hand.
9. Class Inclusion
    - a. Review the class label of clothing.
    - b. Use the shirt, tie and one glove
    - c. Are there more cloth things or clothing?
    - d. Are there more clothing or leather things?
10. Guessing Game
    - a. Use multiple basis, i.e. at least 2 attributes
    - b. I'm thinking of something that is leather and has metal on it. (belt or watch).
    - c. Cloth and you wear above your knees (tie or shirt).
    - d. Something that there is a pair of and you wear on your feet (shoe or sock).
11. Pantomime Game
    - a. Have one child pantomime the use of a piece of clothing.
    - b. Ask the other children to guess which one it is.

SESSION 3

MATERIALS: 5 trucks, 1 bus, 1 motorcycle, 1 big car, 3 small cars, 2 sailboats 2 canoes, 4 big airplanes, 2 helicopters, 2 small planes, 1 stagecoach, 1 racing car

GENERAL PROCEDURE:

1. Place in center of table enough different kinds of vehicles so that there is one kind for each child. (Example: 1 truck, 1 plane, 1 car, 1 boat, 1 bus, etc.) For the groups of four children, have 2 vehicles for each child.

2. Have one child select one of the vehicles and identify it.

    a. (Name) pick up one of these things from this pile and tell us about it.

    b. Can you tell us what it does? Can you think of other kinds?

    c. Deal with the leftover objects in a group. ... Who can tell me about this? ... What does it do?

    d. Establish the use of the class label - vehicle.
        1) I'm going to tell you a new word for all of these things. That word is VEHICLES.
        2) Have the children repeat the word.
        3) Explain how this word is for all means of transportation and this includes things that carry people and loads of things.

3. Discuss the different attributes of the vehicles by making piles.

    a. Have one child put his vehicle in the center of the table.

    b. Question: Everyone who has a vehicle that does the same thing as this put it with the one on the table. What do they all do?

    c. For the leftover objects, have the children do it in a group.

    d. Piles:
        1) Function - things that fly, things that you drive, things that float - 3 piles
        2) Location of use - ground, air, water - 3 piles
        3) Material made from - plastic, metal, both - 2 piles, then 1 pile
        4) One that carry people, ones that carry a load of something, ones that do both - 2 piles, then 1 pile

4. Discuss the differences of the vehicles in several groupings by asking how they are the same and how they are different.

    a. E makes the piles one at a time.

b. Piles:
   1) Things that you drive.
   2) Things that you fly.
   3) Things that float.

c. Emphasize that while they are different kinds of things they are all vehicles.

5. Class Inclusion

   a. Use 2 trucks, 1 plane, 3 cars.

   b. Are there more trucks or vehicles?

   c. Are there more cars, or things that go on the ground?

SESSION 4

MATERIALS: 4 large planes, 2 small planes, 2 helicopters;
1 large car, 3 small cars, 1 racing car;
5 trucks

GENERAL PROCEDURE:

1. Review Session #3 - "Remember yesterday we talked about all kinds of things we called vehicles. What did we say about them?"

2. Today we are going to talk about some of the same vehicles. (Make sure they understand the word vehicle.)

3. Use the 8 planes

   a. Have one child give the common function for all 8 planes - They all fly.

   b. How are they different?
      1) Different kinds of planes - jets, helicopters, propellor (short discussion of propellors may be necessary)
      2) Different materials - rubber, hard plastic
      3) Different colors

   c. Establish that each can be a plane yet they are different kinds.

4. Use 5 cars

   a. Function - you drive them all.

   b. Differences
      1) Convertibles, station wagons, regular (sedans)
      2) Metal, plastic
      3) Colors

   c. Establish kinds with the class of cars.

5. Use 5 trucks
    - a. Function - you drive them and carry a load of something.
    - b. Differences - what each one is used for (fireturck, cement, etc.)
    - c. Establish kinds within the truck class.
6. Taking one object from each subclass, review "vehicles."

SESSION 4: PART 2

MATERIALS: 2 kinds of cars, 2 kinds of trucks (all small plastic)

GENERAL PROCEDURE:

1. Give each child 1 racer and 1 convertible of the same color.
2. Establish attributes by having each child tell something about his car. ... Try to avoid color.
    - a. Both cars
    - b. One is a racer, one is a convertible
    - c. Both move
    - d. Ride in both
3. Have children put their cars into 2 piles in the center of the table according to kind of car (racer, convertible).

   Add extra cars from baggie, putting into correct piles.
4. Class Inclusion
    - a. Are there more yellow racers or racers?
    - b. Are there more green racers or cars?
    - c. Are there more black cars or racers?
    - d. Are there more convertibles or cars?
    - e. Are there more red cars or cars?
    - f. Are there more cars or racers?

SESSION 5

MATERIALS: Lion, tiger, zebra, hippo, giraffe, reindeer, bear, gorilla, rhino, kangeroo, moose, camel, elephant, buffalo

GENERAL PROCEDURE:

1. Give an animal to 1 child (there are enough animals for each child to eventually deal with two - in smaller groups deal with the leftovers in a group). After the child is finished discussing his animal, have him put it in the cage.
2. Have the children tell about their animals. Don't dwell on this part.
    a. What kind it is.
    b. Where it is found.
    c. Sound the animal makes, if any.
3. Establish differences and similarities
    a. They are all animals, but they are different kinds.
    b. Similarities
        1) All have legs.
        2) All stay on the ground.
        3) Alive - "What do we mean when we say something is 'alive'?"
            a) It moves.
            b) It eats things.
            c) What other things are alive? (People, flowers, birds, etc.)

REMOVE ALL OF THE ZOO ANIMALS

SESSION 5: PART 2

MATERIALS: Dog, cat, lamb, pig, cow, horse, rabbit

GENERAL PROCEDURE:

1. Identify the animals in the same way as above.
2. Establish the differences and similarities
    a. Ask one child to find one animal that lives in a house. Ask another child and another until all are found. (In this case there are only 2)

       Do the same for animals that live outside.
    b. Have one child put into a pile one animal that you can eat. Have another child do the same until all of the animals that can be eaten are in a pile. Then ask the children to give the reason for their being the same.

2

LEAVE HORSE, CAT, DOG, PIG, AND BRING IN LION, ELEPHANT, CAMEL, AND GORILLA

SESSION 5: PART 3

GENERAL PROCEDURE:

1. Have one child select one animal that you can ride on. After all are chosen ask what is the same about them.

2. Do the same for ones that live in a house.

3. Have the children put the animals into 2 piles, farm animals and zoo animals.

   a. Are there more house animals or animals?

   b. Are there more animals or animals that you ride?

4. Guessing Game

   Have the children look at the 8 animals very carefully. Take them all away keeping one hidden in your hand. Have the children guess the animal by asking questions about it, such as: Is it a farm animal? Can I ride it? Does it belong in a zoo? Is it big? Etc. Don't let them ask if it is a specific animal, such as: Is it the lion?

   It may be necessary to give them some help in the beginning by suggesting some questions that they might ask to find out what the animal is.

SESSION 6

MATERIALS: Baggie of "creepy crawlers" - lizard, snake, rat, spider, frog, alligator, crawfish, turtle

Baggie of birds - different colored birds - 4 of them pelican and flamingo

GENERAL PROCEDURE:

1. Review the farm and zoo animals - "Remember the animals we talked about the last time? What can you tell me about them?"

   a. They were all alive.

   b. They all had legs - 4.

   c. They all stayed on the ground.

2. Introduce the "creepies"

   a. Give each child 1 animal at a time dealing with the leftovers in a group.

   b. Discuss each of the animals in terms of:
      1) Whether they are found in the country or the city.
      2) If they are land animals, water animals, or live in both [land - spider, rat; water - alligator, snake, frog, crawfish; both - lizard, snake, alligator, frog, spider (?)].
      3) Have the children think of as many other animals like these that they can - suggestions: butterflies, fish, ladybugs, flies, ants.

   c. Remove all of the animals.

3. Introduce the birds

   a. Discuss - they all fly
      they all are birds
      they all are animals

   b. Have children think of other birds or things (animals that fly) such as butterly, bat, bugs, etc.

4. Keep out one red bird and the flamingo, bring back horse, pig, tiger, gorilla, rat, and alligator.

   a. Ones we find in the zoo.

   b. Ones with 4 legs, 2 legs.

   c. Ones that fly.

   d. Ones that live in the water or can be found near the water (alligator, bird).

   e. Farm animals - horse, pig, rat.

5. Guessing Games

   a. What's my secret?

      I'm thinking of an animal and I want you to guess which one it is. You ask me questions about it, like, "Does it have 4 legs," or, "Does it live in the water?" and I'll say yes or no. See if you can tell from my answer which one it is.

   b. Have one of the children think of an animal and ask the others to guess.

SESSION 7

MATERIALS: Box of Negro family peeps (grandparents, parents and children)

GENERAL PROCEDURE:

1. Introduce the immediate family - father, mother, 3 children.

    a. Discuss the different things that they represent.
        1) They are all people (all alive).
        2) They are all part of a family.
        3) Father is a man and a husband.
        4) Mother is a woman and a wife.
        5) Children are brothers and sisters and there is one that is a baby, daughter and sons.

    b. Put into groups according to:
        1) Sex - man, boys and woman, girls.
        2) Age - adults and children (use these labels).
        3) Parents and children.

2. Introduce the grandparents.

    a. Discuss the different things.
        1) They are people.
        2) Parents.
        3) Man and woman.
        4) Grandparents - grandmother, grandfather.
        5) Husband and wife.

    b. Redo groups.
        1) Sex.
        2) Age - 3 groups.
        3) Parents and children.
        (Note: Here the initial parents can also be children of the grandparents.)

3. Class Inclusion

    a. Are there more parents or people?

    b. Are there more people or adults?

    c. Are there more children or people?

    d. Are there more males or adult males?

4. Try a discussion of aunts and uncles and cousins.

    a. Who knows what we call the sister of the father?

    b. Brother.

    c. Their children.

SESSION 8

MATERIALS: Box of community peeps - fireman, farmer, telephone man, janitor, doctor, teacher, salesman, bus driver, mailman, policeman, nurse, and newsboy.

GENERAL PROCEDURE:

1. Review the previous session on peeps in a family and their relationships.
    a. Children can be sons and daughters, brothers and sisters.
    b. Parents can be husbands and wives, men and women, daughters and sons.
    c. Grandparents can be husbands and wives, parents, grandmothers and grandfathers, men and women.
2. Introduce the community peeps.
    a. Identify all 12 individually according to the function they perform in the community.
    b. Discuss them in terms of:
        1) Males, females, boys.
        2) Which ones could be parents, fathers, mothers, children.
        3) Move to husbands and wives, uncles, aunts.
        4) Relate to the children. "Does anyone have a relative that does something that these people do?"
3. Emphasize how they can all be people, part of a family, and at the same time be a fireman, etc.
4. Guessing Games
    a. I'm thinking of a person who is a man, he wears a uniform when he works and could be a father - policeman, mailman, etc.
    b. I'm thinking of a person who could be a mother and who helps us learn - teacher.

SESSION 9

MATERIALS: Pictures of flower, cactus, grass, tree, vegetable, fruit, vine, and underwater plants

GENERAL PROCEDURE:

1. Give each child a picture (one).
2. Have the children briefly tell about their pictures.

3. Establish differences and similarities

   a. They are all plants but they are different kinds.

   b. Similarities
      1) All are alike.
      2) All grow.
      3) Similarities and differences between smaller groups: water plants vs. land plants; edible vs. nonedible.

4. Reintroduce the lion, cat, alligator, turtle, cow.

   a. Review the animals briefly.

   b. Find similarities and differences among the plants and animals.
      1) All are alive.
      2) All grow.
      3) Animals move, plants do not.
      4) Animals talk, plants do not.

5. Class Inclusion

   a. Are there more living things or animals?

   b. Are there more living things or plants?

   c. Are there more living things or things that move?

6. Guessing Game

   a. What am I thinking of?
      I'm thinking of something on the table and I want you to guess what it is. You ask me questions about it like, "Does it move?" or "Can you eat it?" and I'll say yes or no. See if you can tell from my answers which one the thing is.

   b. Have one of the children think of something on the table and have the others (including the teacher) ask the questions.

7. Teacher is Wrong

   a. I'm going to name some plants. When I name a plant, everyone say "yes", and when I name something that is not a plant say "no, the teacher is wrong." Ready. Listen carefully.

   b. Plants - flower, tree, elephant, plant, grass, bush, mother.

   c. Animals - giraffe, tiger, bird, gorilla, shirt, horse, butterfly, mailman.

   d. If there is time, do the same for vehicles and people.

SESSION 10

MATERIALS: Vehicles - car, truck, plane; people - boy, woman; animals - giraffe, snake, frog, monkey; plants - flower, tree

GENERAL PROCEDURE:

1. Review plants
   - a. Identify each one.
   - b. Commonalities
     - 1) All grow.
     - 2) All are alive.
   - c. Establish class label.
2. Vehicles
   - a. Identify each one.
   - b. Commonalities
     - 1) All move
     - 2) All have wheels
     - 3) They are not alive.
3. People
   - a. Identify each one. Make sure all the possibilities are discussed - such as the boy can be a son, brother, etc.
   - b. Commonalities
     - 1) All alive.
     - 2) All move.
     - 3) All talk.
4. Animals
   - a. Identify each one.
   - b. Commonalities
     - 1) All move.
     - 2) All talk.
     - 3) All alive.
5. Make groupings.
   - a. Put together all the ones that move.
   - b. Put together all the ones that are alive.
   - c. Put together all the ones that grow.
   - d. Put together all the ones that talk.

6. Class Inclusion

   a. Are there more living things or plants?

   b. Are there more vehicles or things that move?

   c. Are there more things that grow or plants?

7. Guessing Game

   a. I'm thinking of something that is ... Have the children ask questions to discover the object you are thinking of.

   b. Possible questions:
      1) Is it alive?
      2) Does it move?
      3) Does it talk?

8. Teacher is Wrong

   a. I'm going to tell you some things that are alive. When I say each one, if it is alive you say yes. When I tell you one that is not alive, say no.

   b. Butterfly, man, flower, dog, elephant, truck, camel.

   c. Things that move - little boy, tree, car, snake, baby

   d. Things that are not alive - racer, helicopter, motorcycle, flower, firetruck.

APPENDIX B

ATTENTION TRAINING PROCEDURES

SESSION 1: Safari

MATERIALS: Original Jungle Contents

Zebra
Pan
House
Baby
Fork
Motorcycle
Jet
Bus
Car
Soldier

Box 3

4 Camels
7 Bears
12 Mooses
5 Gorillas
5 Buffalos
6 Lions
9 Hippos
2 Rhinos
2 Giraffes
8 Elephants

Box 2

2 Moose: 1 green, 1 brown
2 Buffalo: 1 green, 1 grey
2 Bears: 2 bronze
3 Camels: 3 grey
3 Hippos: 1 blue, 2 brown
4 Elephants: 3 green, 1 black
4 Rhinos: 3 grey, 1 dark
6 Gorillas: 6 dark
6 Lions: 2 grey, 4 dark

PROCEDURE: 1. Explanation and Demonstration

a) "Do you know what a Safari is?" (If not, explain.) "A Safari is an animal hunt."

b) "Today we are going on a Safari. We are going into the jungle to hunt for animals to put in the zoo. (Place box on table.) Here is our jungle. After you catch the animals you have to put them in a cage or they will run away. Here is a cage." (Place cage in front of child.)

c) "I am going to put an animal into your cage. The animal will be all alone. You are the hunter. You go into the jungle and look for an animal just like the one in your cage. When you catch him, put him in your cage too. Then you will have two animals that are just the same."

d) "Then we will put the animals in the zoo. (Place large cage on table.) Here is the zoo."

2. Continue with trials 2 through 15.

3. (Add animals from Box 2 to the jungle.) "Now we are going to do something different. I'm going to put an animal into your cage and you go into the jungle and look for all the animals that are just like that one and put them in the big zoo. (Continue with trials 16 through 19.)

4. (Add animals in Box 3 and animals in zoo to the jungle.) "Now I'm going to give you two animals in your cage and you have to find all the animals that are like both of them.

(Trials 20 through 21.) (Note what strategy the child uses to find the animals, i.e., does he look for both at the same time or does he do one first and then the other.)

ERRORS: When the child makes an error in finding the correct animal, E should question him as to the similarity between the stimulus animal and the one he found. (Usually just the question "are these two the same?" is sufficient to elicit the correction of the error.)

PROCEDURE GUIDE:

1\.

Trial	Put into Jungle	Take Out	Give Child
1.	Blue Rhino	******	Zebra
2.	Olive Lion	Pan	Grey Rhino
3.	Brown Bear Blue Rhino	House	Grey Lion
4.	Black Camel Olive Lion	Baby	Grey Bear
5.	Grey Moose Brown Bear	Fork	Grey Camel
6.	Blue Elephant Black Camel	Motorcycle	Grey Moose
7.	Olive Hippo Grey Moose	Jet	Grey Elephant
8.	Grey Gorilla Blue Elephant	Bus	Grey Hippo
9.	Brown Giraffe Olive Hippo	Car	Grey Gorilla
10.	Black Buffalo Grey Gorilla	Soldier	Grey Giraffe
11.	Brown Giraffe	******	Grey Buffalo
12.	Black Buffalo	******	Grey Rhino
13.	Blue Rhino	******	Grey Lion
14.	Green Lion	******	Grey Bear
15.	Brown Bear	******	Grey Camel

2.	Trial	Put into Jungle	Take Out	Give Child
	16.	Animals in Box 2	******	Grey Elephant
	17.	******	******	Grey Moose
	18.	******	******	Grey Gorilla
	19.	******	******	Green Hippo
3.	20.	Animals in Box 3	******	Grey Lion Dark Bear
	21.	******	******	Dark Camel Dark Buffalo

SESSION 2: Block Games

MATERIALS: Each S gets eleven blocks: 4 squares, 2 short cylinders, 2 rectangles, 2 short square rods, 1 long square rod (to be used in Steps 1 - 5 only).

PROCEDURE: Construct the model so the child will see the view on the sheets following.

In explaining your demonstration, tie your verbalizations to your actions as much as possible. Use such phrases as, "I put a square on here" ... "and a long round one here," etc.

Be sure that the design has been copied correctly before moving on to the next model. Verify correctness of child's design with model.

1. Simple design

   a. E makes #1 (see sheet following)

   Directions: "I'm going to build something with my blocks. Watch me." (Build slowly, explaining each step.) "Now you build one just like this." (Point to model.)

   b. Subject copies model.

2. Simple design and movements

   a. E makes design in numbered sequence (see #2 on sheet following)

   Directions: "Watch how I build this; see how the square block comes first, then the big block comes second, then the long skinny one comes third and then the short, skinny one last." "Now you make one the same way I made this one." (Point to model.)

3. Complex design

   a. E makes #3 (see sheet following)

   Directions: Same as in #1 above.

   b. Subject copies design only.

4. Complex design and movements

   a. E makes design in numbered sequence (see #4 on sheet following)

   Directions: Same as in #2 above.

   b. Subject copies model in same sequence.

ERRORS: If the child makes a mistake in placement or order, ask him if his design is the same as the standard. If he says they are, point to corresponding blocks on the two designs (standard first) and ask whether the child's blocks are in the same place as those of the standard.

5. Have subject build model for you to copy

Have subject put blocks into box.

---

6. E builds the following pairs of designs and S looks for differences between the two.

   Directions: "Now I am going to build two things for you. Watch me." (Build two models [see #6 on following sheets].) "Are these two the same or can you find something different about them?" (Child can move around and examine models from all sides.)

   a. Simple

   b. Medium

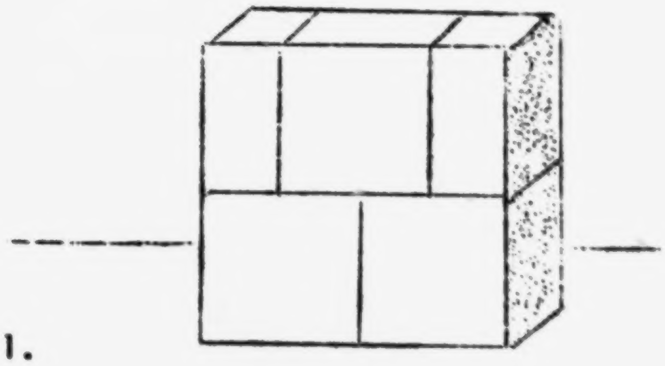
   c. Complex

ERRORS: If child incorrectly says the two designs are the same, point to corresponding blocks on the two and say, "are these the same?" until child understands and corrects the differences.

If child still does not see that the two designs are different, tell him they are and ask him to find the differences. If he can't, show him one difference and ask him to find the rest.

B - 5

BLOCK DESIGNS



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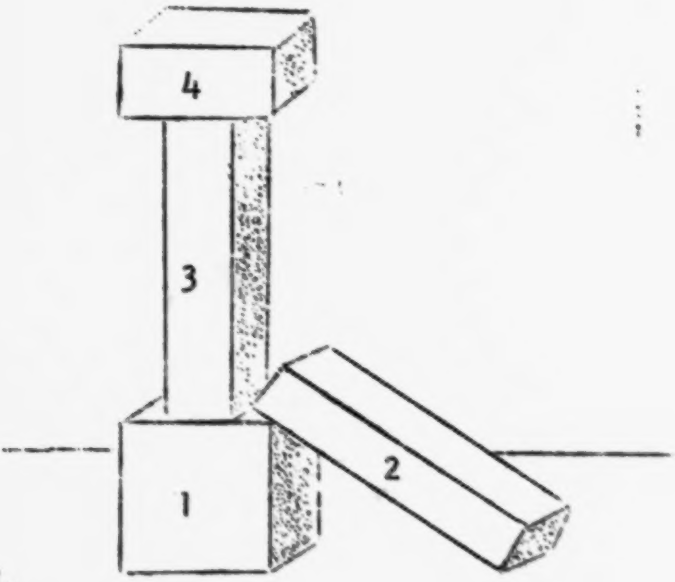

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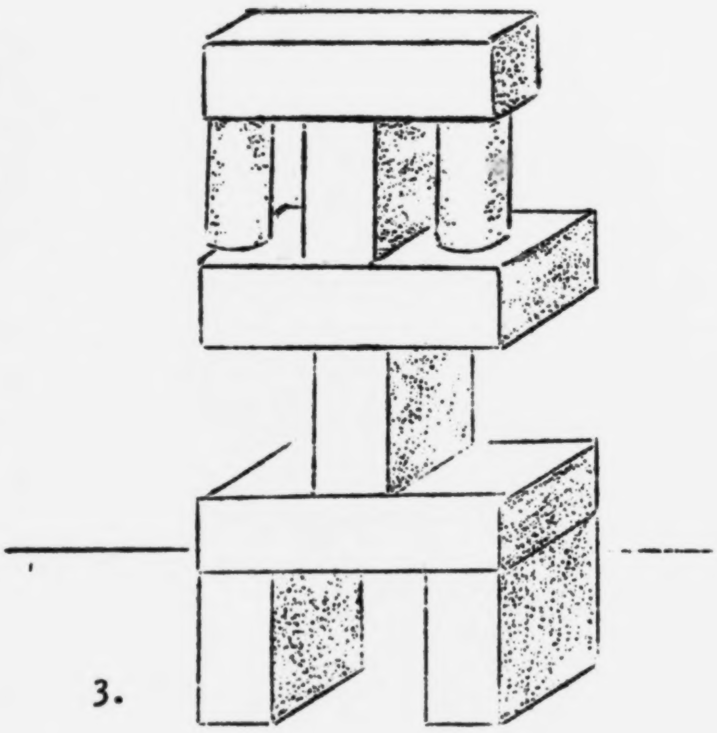

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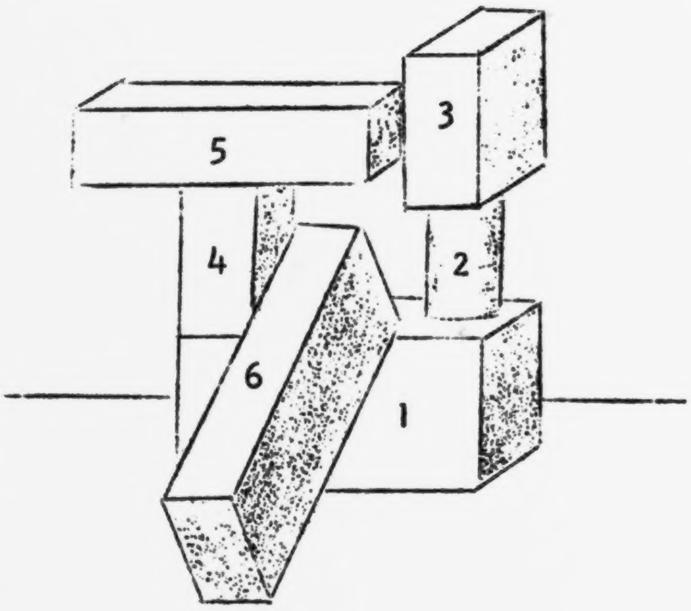

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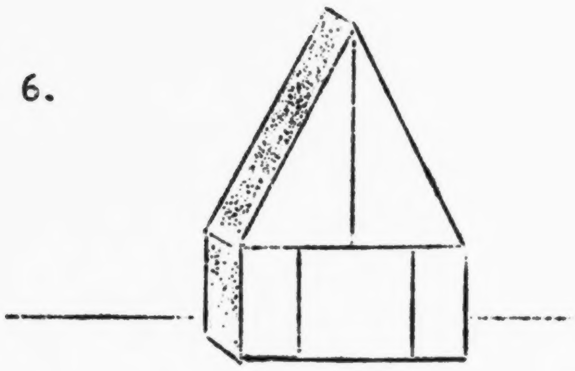
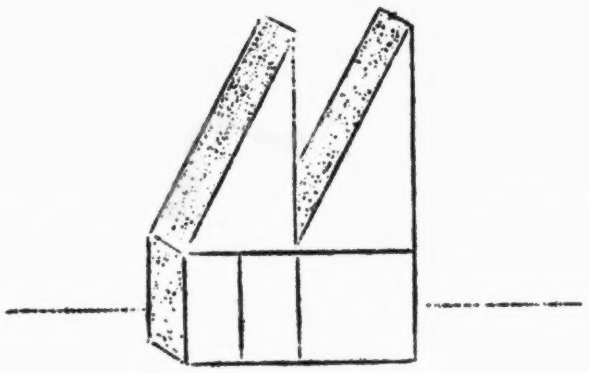
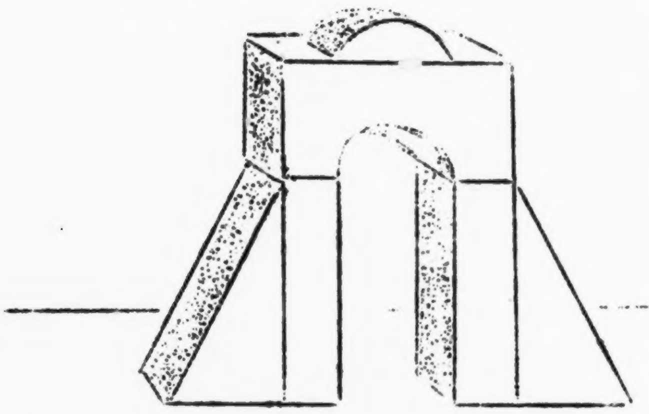


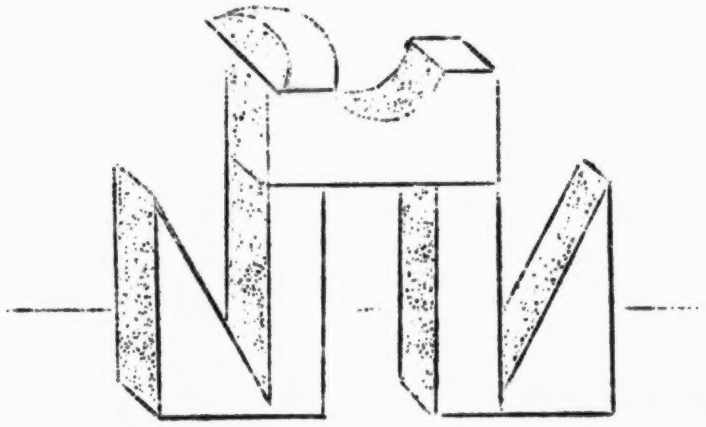
a. Standard



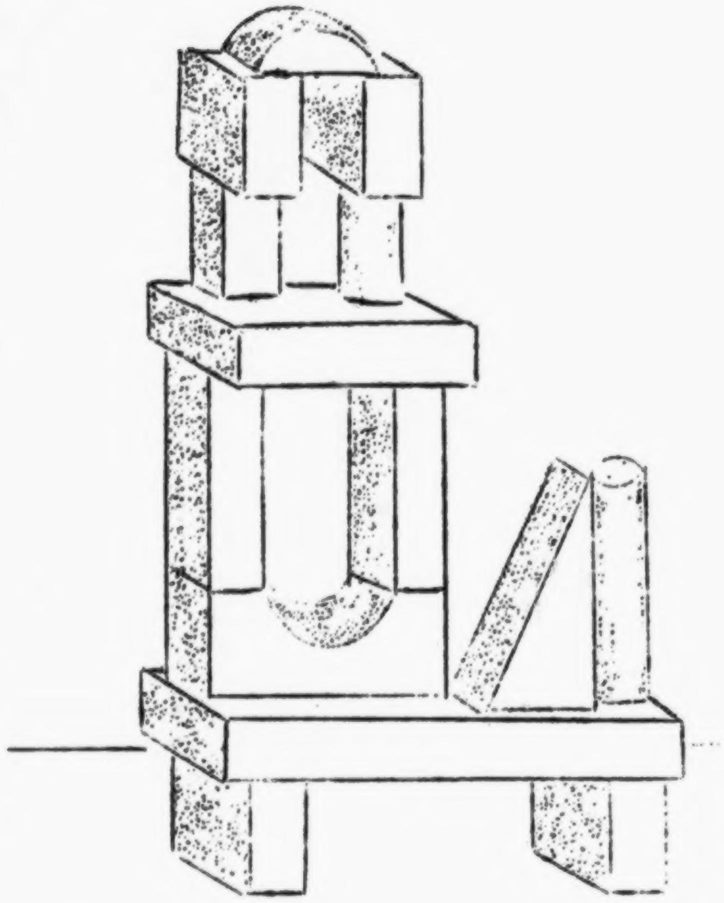
a. Comparison



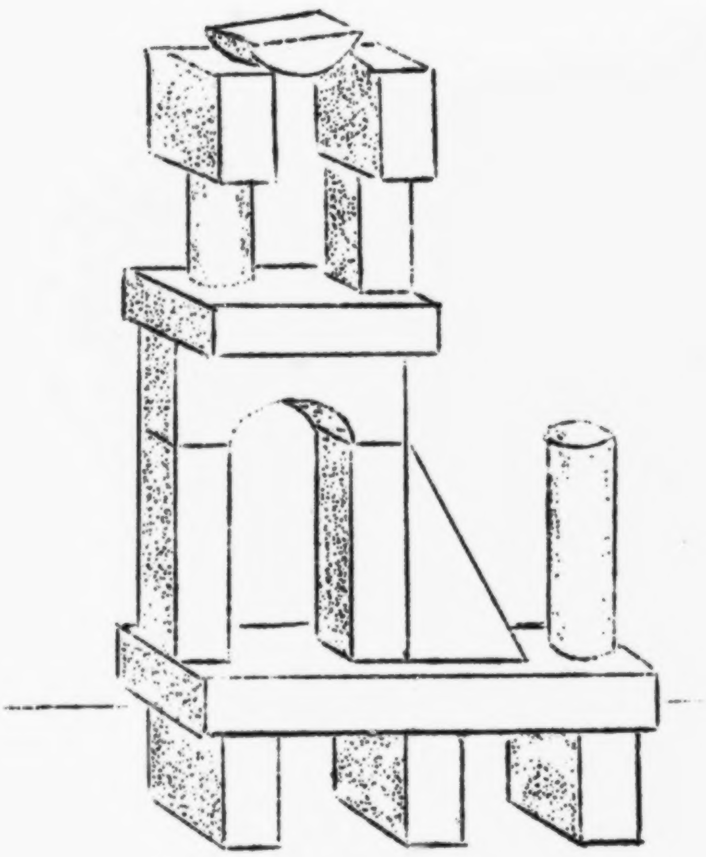
b. Standard



b. Comparison



c. Standard



c. Comparison

SESSION 3: Picture Card Game

MATERIALS: (1) Two brown elephants, one blue elephant, one blue hippo. One black, fifty gram weight
(2) Two Milton Bradley Memory Card Matching Games (arranged in special sequence)

PROCEDURE: 1. Introduction

(To find out the child's understanding of "same" ask:)

"What do we mean if we day things are the same?"

(If child seems to understand "same", continue to ask about "different", "identical", and "similar"; if not, explain these as follows:)

"If two things are the same, they can be completely alike or they can be partly alike. If they are completely alike we say they are "Identical." If they are only partly alike we say they are "Similar." If things are not alike we say they are "Different."

(Discuss these terms and let child repeat them a few times. Then, using the objects, do the following:)

(Show two blue elephants.) "Are these two the same? These two elephants are the same because they are completely alike. They are both elephants and they are both the same color. If things are completely alike, what do we call them? (Wait for a response.) If things are completely alike, if they are alike in every way, we call them IDENTICAL."

(Show the blue and the brown elephants.) "Are these two the same? These two elephants are the same because they are partly alike. They are both elephants but they are not completely alike. There is something that is not the same about them. What is it? (Wait for a response.) They are different colors. One is blue and one is ...... If things are partly alike, they are not the same in every way. They are only the same in some ways. We call these things SIMILAR. They are not IDENTICAL.

(Show blue elephant and blue hippo.) "Are these two the same? These two animals are the same because they are partly alike. They are SIMILAR. Why are they similar? (Wait for response.) They are both the same color, they are blue. Are they identical? No, they are not identical, they are SIMILAR.

(Show brown elephant and blue hippo.) "Are these two the same? These two animals are not the same. They are different colors and they are different animals. Is there any way that they are alike?" (Establish that they are both animals.)

(Show brown elephant and black weight.) "Are these two the same? These two things are not the same. They are different colors and different things. We call them completely DIFFERENT."

2. Use of comparison terms with pairs of pictures

"Look at this card. It is a picture of a butterfly. Now look at this other card. What can you tell me about these two cards? ... That's right, they are IDENTICAL. Now, look at this card. (Show Card #2 - a tree, placing it on top of and covering one of the butterflies.) Is this one (Card #2) identical to this one (Card #1)? No, they are not identical. They are different."

"I am going to show you some cards, two at a time. Each time I show you some new ones, you tell me if they are IDENTICAL, SIMILAR, of DIFFERENT."

(Note: When you get to Trial 13, you will find two examples of the same class, i.e., flowers. If the child says they are different, ask him what is different about them. Bring out the idea that they SIMILAR because they are flowers, but that they are not the same kind of flower. If he says they are the same, find out why and show how they are different kinds of flowers. Point out that they are SIMILAR because they are both flowers.)

3. "Look at this card. It is a picture of a ball. I have two more pictures here. When I show them to you, I want you to pick the one that's IDENTICAL to this one." (Turn the other cards over.) "O.K., now find the one that's IDENTICAL to this one."

"Now, look at this card. It is a picture of a boat. I'm going to show you two more pictures and I want you to pick the one that is IDENTICAL to this one." (If they have trouble with IDENTICAL go over the meanings of IDENTICAL, SIMILAR, and DIFFERENT again.)

"Now we are going to look at some more pictures. Every time I am going to show you one card first and then two more. I want you to pick the card that is IDENTICAL to the one up here. (In many cases the other choice is similar but not identical to the sample and if the child picks this one, discuss his choice and how it is only partly like the sample card, i.e., similar and not identical.)

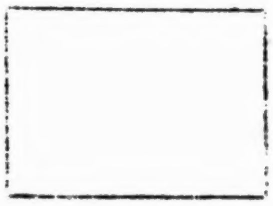
4. "This time I'm going to show you three cards to pick from and I want you to find the one that's IDENTICAL to the one I put up here. (Here again, in many cases, one alternative is similar but not identical to the sample card. Proceed as above.)

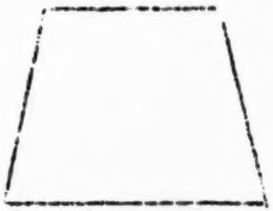
5. "Now we are going to do something different. I'm going to show you four cards and I want you to pick the two that are IDENTICAL. Pick the two that are the same in every way." (Sometimes a third card is similar to either the identical pair or to the fourth card. Proceed as above.)

ERRORS: If the child should use the wrong term to describe any stimulus cards, question his response and ask the child why they are identical, different, or similar. Then correct him and continue.

SESSION 4: Geometric Figures

MATERIALS: Display board with six windows, paper roll of geometrics (figures), box of plastic geometric figures on sticks.





PROCEDURE: 1. Introduction

"Do you remember what we did yesterday? That's right, we looked at pictures on cards that were IDENTICAL, SIMILAR, or DIFFERENT. What does IDENTICAL mean? What does DIFFERENT mean? What does SIMILAR mean?

"If two things are completely the same, what do we call them? If two things are partly alike what do we call them?

(Review the three concepts until the child knows what they mean. Use the objects from the previous session if necessary.)

"Today we are going to look at things in these windows. How many windows are there? Can you name the animals over these windows? (Point to windows 2 through 6 as child names animals.)

2. Use of comparison terms with geometric pairs.

"First, we will see things in these two windows (point to windows 1 and 2), and I want you to tell me if they are IDENTICAL, SIMILAR or DIFFERENT. Ready, watch closely." (Work through pairs. All pairs are either the same geometric figure in the same position or two different geometric figures.)

3. Matching the sample (Identity)

a. Two alternatives

"Now I am going to show you three things. I want you to look at the one in this window (point to the first window). Then look at the other figures (point to 2nd and 3rd windows) and tell me which one is IDENTICAL to this one (point to first window again). Ready?" (Have one practice trial if necessary.)

b. Three alternatives

"Now I am going to show you four things. I want you to look at the one in this window (point to the first window). Then look at the other figures (point to the 2nd, 3rd and 4th windows) and tell me which one is IDENTICAL to this one (point to first window again). Ready?"

c. Four alternatives

"Now I am going to show you five things. I want you to look at the one in this window (point to first window). Then look at the other figures (point to 2nd, 3rd, 4th, and 4th windows) and tell me which one is IDENTICAL to this one (point to first window again). Ready?"

d. Five alternatives

"Now I am going to show you six things. I want you to look at the one in this window (point to first window). Then look at the other figures (point to 2nd, 3rd, 4th, 5th, and 6th windows) and tell me which one is IDENTICAL to this one (point to first window again). Ready?"

NOTE: As b, c, and d begin say, "Now you will have to look at this window also," and point to the next window.

4. Use of comparison terms with geometric pairs

"Now we will see things in only two windows again (point to windows 1 and 2). I want you to tell me if they are IDENTICAL, SIMILAR, or DIFFERENT. Ready, watch closely. (This time all pairs are either the same geometric figure in two different orientations or two different geometric figures.)

Use plastic geometric shapes to verify similarity when necessary.

5. Matching to sample (Similarity)

a. Two alternatives

"Now I am going to show you three things. I want you to look at the one in the first window. Then look at the other figures (point to 2nd and 3rd windows) and tell me which one is SIMILAR to this one (point to the first window again). Ready?"

b. Three alternatives

"Now I am going to show you four things. I want you to look at the one in the first window. Then look at the other figures (point to 2nd, 3rd, and 4th windows) and tell me which one is

SIMILAR to this one (point to the first window again). Ready?"

c. Four alternatives

"Now I am going to show you five things. I want you to look at the one in the first window. Then look at the other figures (point to 2nd, 3rd, 4th, and 5th windows) and tell me which one is SIMILAR to this one (point to first window again). Ready?"

d. Five alternatives

"Now I am going to show you six things. I want you to look at the one in the first window. Then look at the other figures (point to 2nd, 3rd, 4th, 5th, and 6th windows) and tell me which one is SIMILAR to this one (point to first window again). Ready?"

NOTE: As b, c, and d begin say, "Now you will have to look at this window also," and point to the next window.

ERRORS: If child picks a figure that is not IDENTICAL ask him whether it is completely like the stimulus figure. If he says they are completely alike explain by pointing to different corresponding parts and asking whether they are completely alike. Then ask the child to look over the array and try to find one that is IDENTICAL to the stimulus item. If he can't find one IDENTICAL, ask him to find a SIMILAR figure. If he still can't find one, show him a possible answer and explain why (e.g. they both have 3 points, they both are round, or curvy, etc.).

SESSION 5: Mosaics

MATERIALS: Each S gets the following tiles:
red 6 ◺ and 14 ▭ ;
blue 6 ◺ and 10 ▭ ;
yellow 6 ◺ and 14 ▭ ;
white 6 ◺ and 20 ▭ .

There are four stimulus boards with tiles glued down in different patterns. On each board there are four designs varying in complexity from A to D (see following page). The boards increase in complexity from 1 to 4 by varying colors and position.

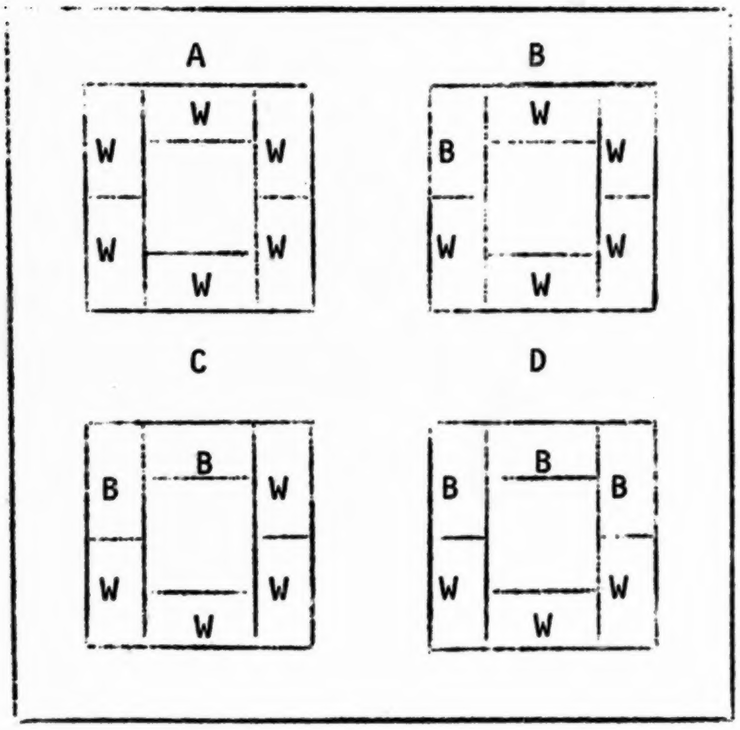
PROCEDURE: Construct (or display) each model such that the top edge of the design (as indicated by arrow) is toward the teacher.

In explaining a demonstration, tie your verbalizations to your actions as much as possible. Use such phrases as, "I put a blue triangle here" ... "and a yellow rectangle here."

Be sure that the child has copied the design correctly before moving to the next one. Verify the correctness of the child's design. (Verify correct designs as well as incorrect ones.)

MOSAIC DESIGNS

1.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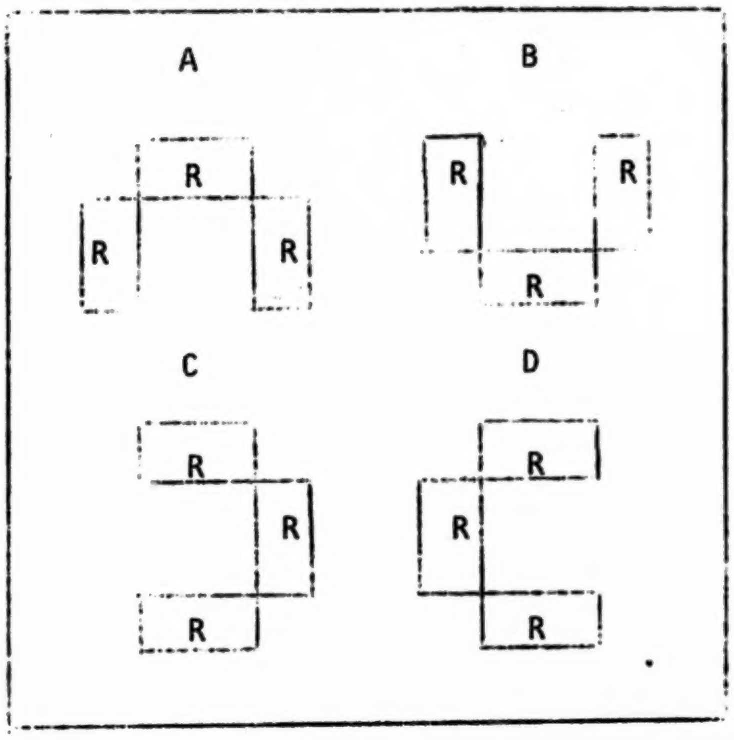
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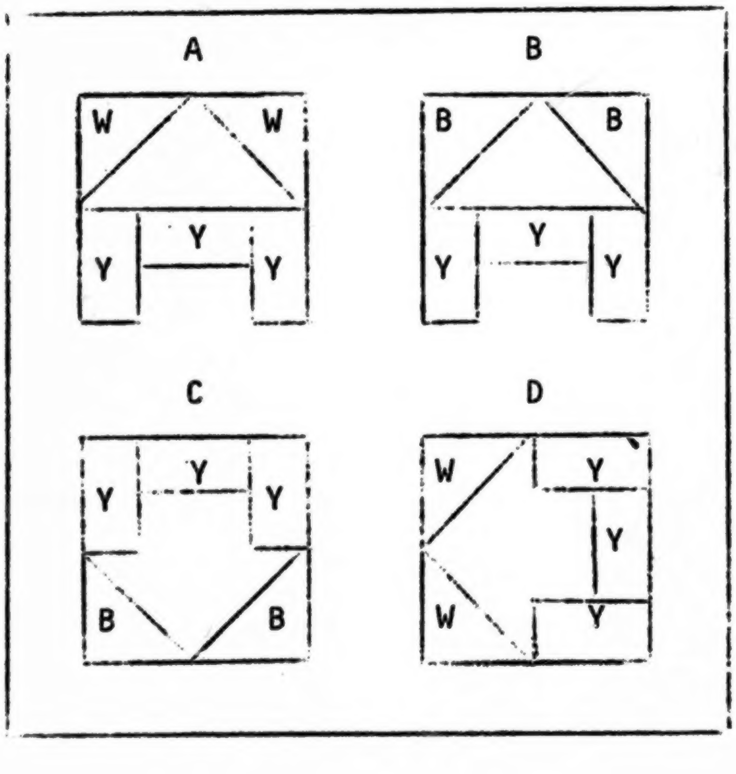
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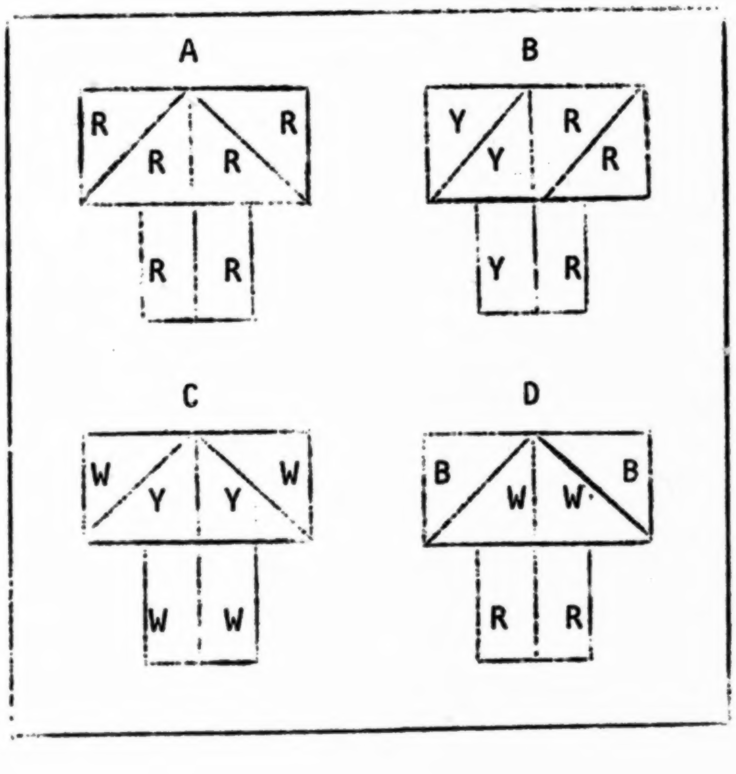
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Also check to see that each child's model is in the correct place on the board. Check by counting the number of rows between patterns, etc.

At the beginning of the session discuss the two shapes of tiles (triangles and rectangles).

Also include a few minutes of free play with the tiles before going on to Design 1.

1. Simple progressive color changes

    a. E shows part A on preconstructed board and then demonstrates building of it.

    Directions: "I'm going to make one to look like this one. Watch me. (Build slowly, explaining each step.) Now you make one just like this." (Point to model.)

    b. Child copies part A.

    c. Expose parts B, C, and D in order, demonstrate and have child copy them (one at a time).

    d. Discuss differences between A & B, B & C, C & D, etc.

2. Simple changes in orientation

    a. E shows parts A & B of pre-formed design and then demonstrates building of them.

    Directions: Same as above.

    b. Child copies parts A & B.

    c. Expose entire board, demonstrate building of C & D and have child copy designs.

    d. Discuss orientation changes.

3. Color and orientation changes

    a. E shows whole preconstructed board and explains various patterns. (No demonstration!)

    b. Child copies entire board.

    c. Discuss differences between various patterns.

4. Complex changes in color

    a. E exposes entire preformed model. No instructions or demonstration is given.

b. Child copies model.

c. Discuss progressive differences between the patterns.

ERRORS: When child makes mistakes in placement or color, remove incorrect tiles and ask child to finish design.

NOTE: If child has difficulty constructing any of the designs, E should make part of it and let child complete it. After this has been done successfully the child should be allowed to construct design himself.

SESSION 6: Faces

MATERIALS: Two booklets containing pictures of faces on which the eyes, noses and mouths vary in direction and detail (see illustration on page following). Booklet #1 contains five sets of three faces, four faces and five faces. Booklet #2 contains four pages, with two rows of four faces on each page.

PROCEDURE: 1. Pairs of identical faces

a. Sets of three faces

Give child Booklet #1. Point to the first page and say: "Here are three faces. Two of them are identical. Do you remember what we mean when we say two things are identical? If two things are identical they are completely the same. All the parts must be exactly alike. If two faces are identical, the eyes must be identical, the noses must be identical and the mouth must be identical. So look at the noses, eyes and mouths to find which two faces are completely the same. I want you to point to the two faces which are identical."

If the child is correct continue on to the next page. When the child is incorrect have him compare all of the faces on the page and tell which features are identical or different. Then ask the child once again to point to the two faces which are identical.

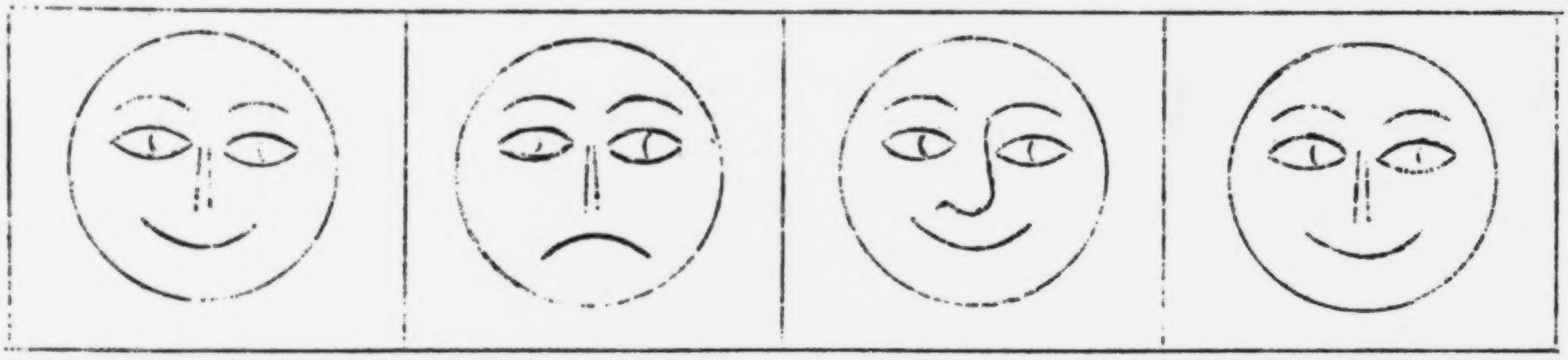
b. Sets of four faces

When the first set of four faces appears say, "Now I would like you to look at these four faces and find the two that are identical."

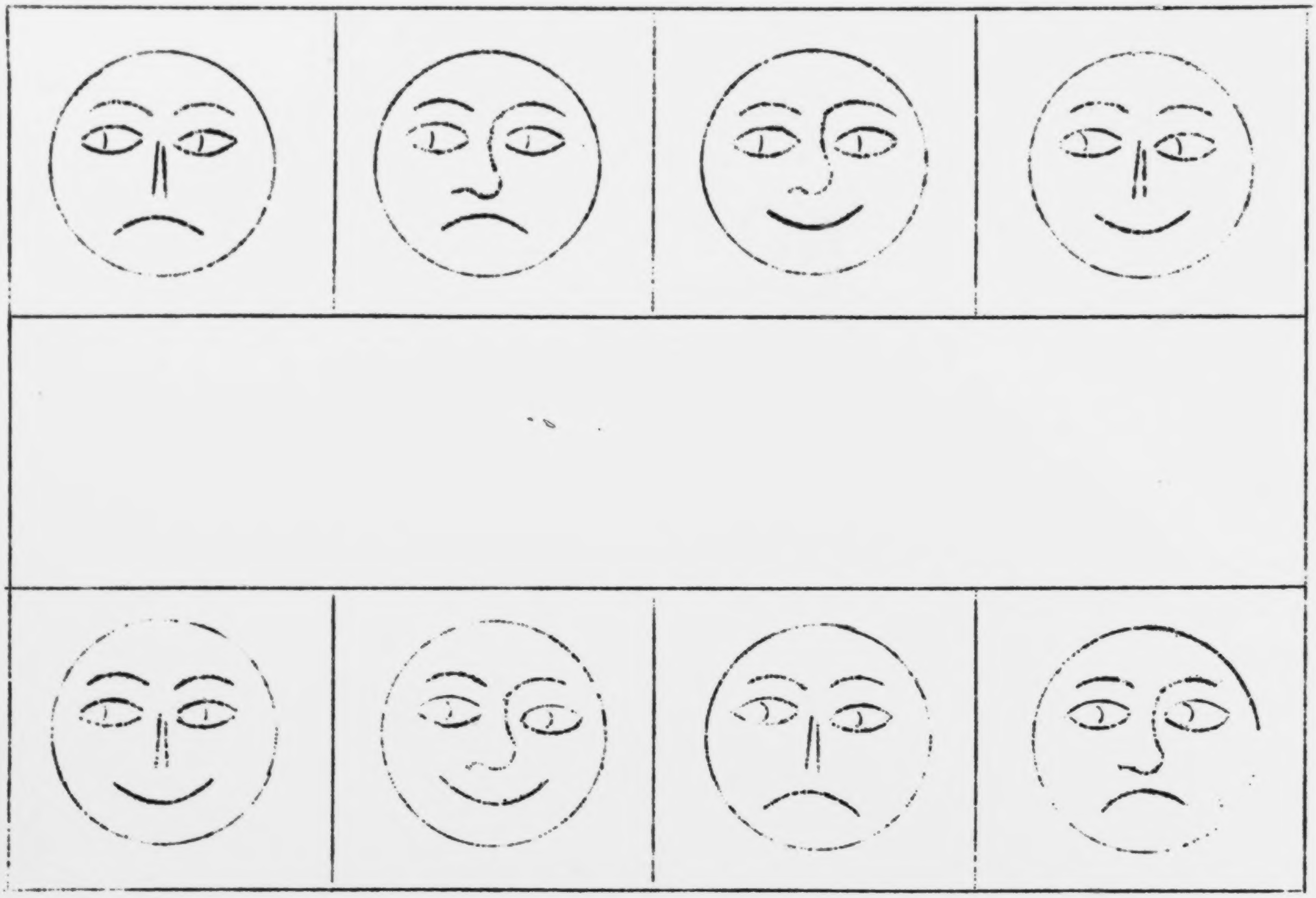
c. Sets of five faces

When the first set of five faces appears say, "Now I would like you to look at these five faces and find the two that are identical."

Sample Page from Booklet #1



Sample Page from Booklet #2



2. Booklet #2

Present Booklet #2 and say, "Now we are going to look at two rows of faces. I want you to find a face in the bottom row that is identical to each one in the top row. When you have found them, draw a line connecting them. Remember to look for identical faces."

ERRORS: If child chooses an incorrect face, tell him to look at each of the features separately and to find the ones that are identical. Then ask him to find the two faces which are identical.

SESSION 7: Geometric Form and Size Discrimination

MATERIALS: Envelopes of cut-out translucent plastic geometric shapes and sheets of paper containing outlines of geometric shapes. The shapes on the paper are colored and patterned in some cases in order to distract.

PROCEDURE: The child is presented with a target item and an array from which he must choose a shape which is identical with the target shape. In each case the child will have the opportunity to verify his choice by either placing the target over the item chosen from the array or by placing a plastic cut-out corresponding to the target item (which the trainer will provide) over the item chosen from the array.

1. Different geometric shapes

   a. Plastic targets and plastic array
   (Envelopes 1A and 1T)
   (Spread out shapes from envelope 1A [array] on the table before the child. Present each shape from envelope 1T [targets[to the child one-at-a-time and tell him to find the shape from the array that is identical to the target he is being shown. NOTE: For each set of targets, there are one or two items for which there is no corresponding item in the array; for these, the child must correctly respond to this effect when presented with these items.)

   "Today we are going to play some games with these shapes. I will show you a shape and you will have to find one that is identical from this group of shapes. Find the one that is identical to this one. When you have found it, place this one (the target) over the one you have chosen (from the array) to make sure that they are identical.

   b. Plastic targets and paper array
   (Envelope 1T and Paper 2A - colors)
   "This time, when I show you a shape, I want you to look at these on this paper and point to the one that is identical to this one. You can put this one (the target) over the one you have picked to see if you have picked the one that is identical to this one (target).

c. Blobs (irregular curved shapes)
Plastic targets and paper array with patterns
(Envelope 3T and paper 3A)

2. Same geometric form--different sizes

a. Triangles--Plastic targets and plastic array
Same instructions as 1. a.

b. Circles--Plastic targets and paper array (all white)
Same instructions as 1. b.

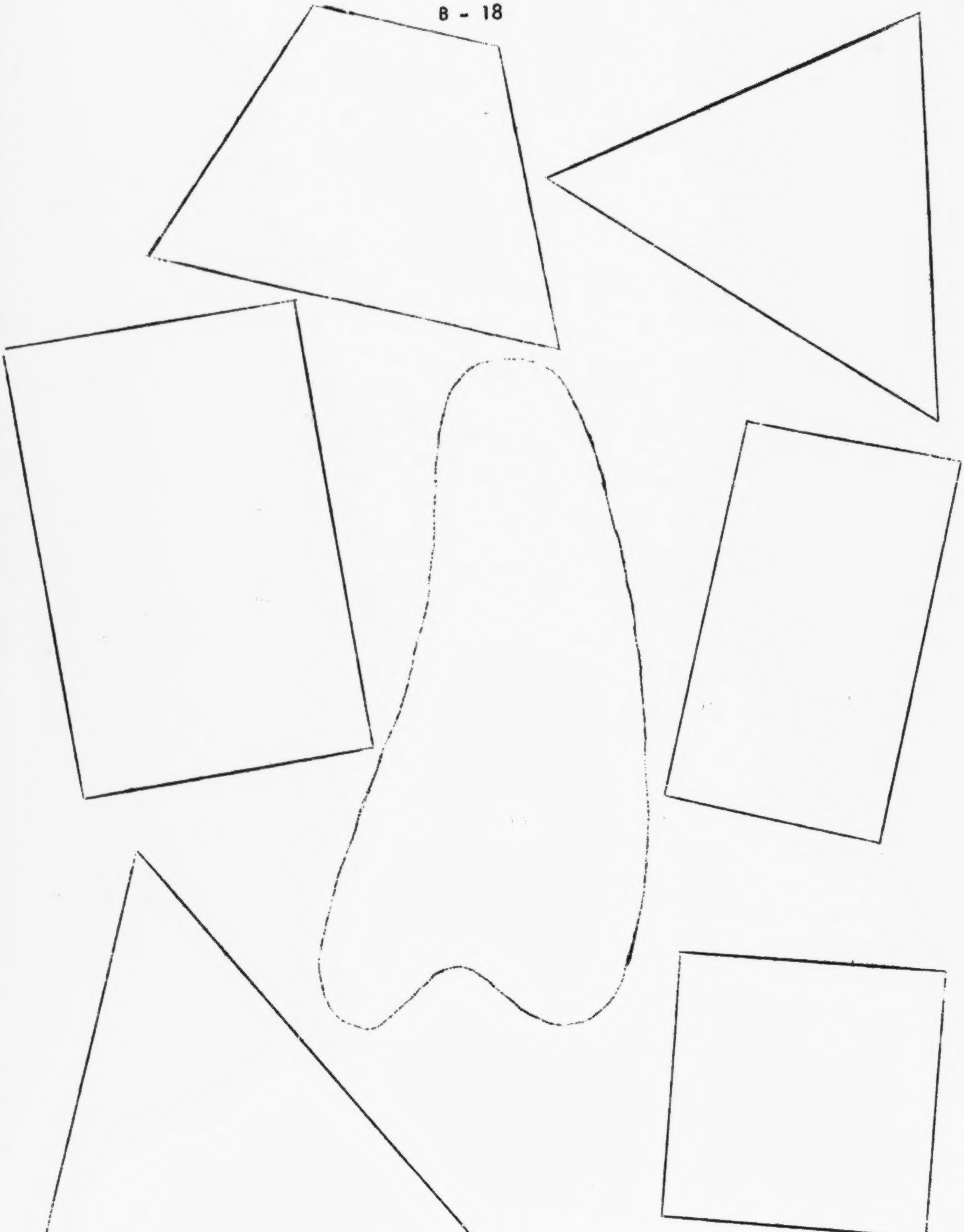
c. Trapezoids--Plastic targets and paper array (different colors) Same instructions as 1. b.

d. Rectangles--Plastic targets and paper array (lines)
Same instructions as 1. b.

e. Squares--Two paper arrays
"This time I will point to one form on this sheet and you pick out the one on this sheet that is identical." (Use plastic forms for verification of choice if necessary.)

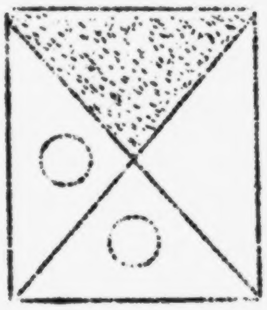
f. Trapezoids--Two paper arrays
Same instructions as 2. e.

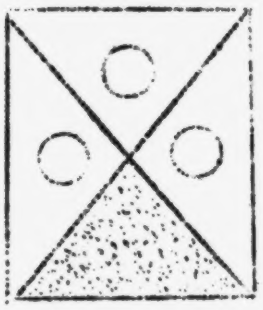
ERRORS: If the child makes a mistake, place the target piece over the one he chose from the array and ask him if the two are identical. If he sees they are not, let him look for the one that is identical to the target. If he does not see that he has erred, explain to him.

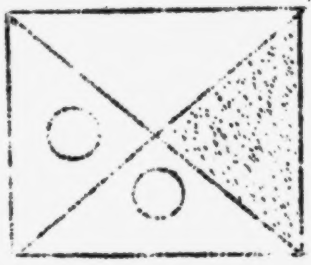


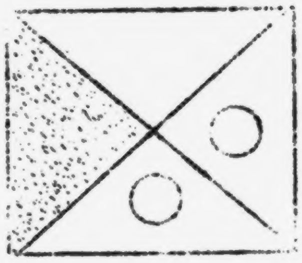
SESSION 8: Complex Pattern Discrimination

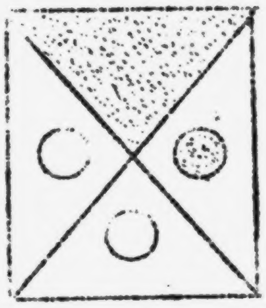
MATERIALS: Display board with six windows and paper roll of geometric patterns.











PROCEDURE:

1. Matching to sample (identity)

   a. Three alternatives
   "Today we are going to look at some things in these windows. I want you to look at the one in this window (point to first window) and find one that is identical to it." (Review meaning of identical if necessary.)

   b. Four alternatives
   On the first set of four alternatives say, "Now you will have to look at this window also," and point to the next window.

   c. Five alternatives
   On the first set of five alternatives say, "Now you will have to look at this window also," and point to the next window.

2. Matching to sample (similar)

   a. Three alternatives
   "This time I want you to look at the one in this window (point to first window) and then find the one that is similar to it." (Review meaning of similar if necessary).

   b. Four alternatives
   On the first set of four alternatives say, "Now you will have to look at this window also," and point to the next window.

   c. Five alternatives
   On the first set of five alternatives say, "Now you will have to look at this window also," and point to the next window.

3. Identical pairs

   a. Three alternatives
      "Now I want you to look at these three figures and tell me which two are identical."

   b. Four alternatives
      "This time look at all four figures and tell me which two are identical."

   c. Five alternatives
      "This time look at all five figures and tell me which two are identical."

4. Similar pairs
   "I want you to look at these five figures and tell me which two are similar.

ERRORS: See Session 4.

SESSION 9: Conjunctive Forms

MATERIALS: Envelopes of translucent plastic forms and booklet of conjunctive forms.

PROCEDURE: 1. Introduction
In order to give the child an idea of how conjunctive figures are made, allow him to draw one or two as follows. Give him paper and pencil, two plastic forms and say:

"I am giving you a piece of paper, a pencil and two figures. You remember we did something with forms like these a few days ago. I want you to draw one of the forms on your paper by tracing around the form like this. (Demonstrate.) Now I want you to do the same thing with the other one right on top of the first one, like this." (Demonstrate again.)
(Allow child to draw one or two groupings.)

"Today we are going to look for figures in drawings just like the ones you have made."

2. Conjunctive forms task.
Spread figures from first envelope on the table and look at page 1 of the booklet. Ask the child to find the figures used to make the picture and to put them on top of the picture where they belong.

Repeat the same procedure for all pictures and envelopes.

Drawing #	No. of Figures	Drawing #	No. of Figures
1	2	10	5
2	2	11	6
3	2	12	3
4	3	13	4
5	3	14	5
6	3	15	4
7	3	16	5
8	4		
9	5		

ERRORS: Usually the children will not be able to find all the items in the more complex pictures. If he cannot, pick part of an item, e. g. the wheel of the truck, or the chimney of the house, and ask him to tell you what it is a part of and then to find that thing.

SESSION 10: Action Similarities and Simon Says

MATERIALS: 48 action similarities pictures

PROCEDURE: 1. Identity Task

Place picture #1 on the table and then place pictures #2, 3, and 4 below it and say, "Today I am going to show you some pictures. Each time I want you to look at the one here (point to single picture) and then look for the one that has someone doing the same thing as the child in this picture is doing."

Follow the same procedure for eight trials.

2. Similarity Task

Place picture #33 on the table and then place pictures #34, 35, and 36 below it and say, "Now I want you to look at the picture here (point to the single picture) and then look for the one that has someone doing something similar to the child in this picture (e. g. lying down, holding something)."

Follow this procedure for four trials.

3. Simon Says

Begin the game by having the teacher and children do what Simon says. After several actions the teacher says one thing and does another and notes whether the children follow what she says or does. Continue the game with the teacher randomly using different actions than instructions. The parallel game of Simon Does can also be used here.

APPENDIX C

Pre-Test Instruments

- Object-picture categorization test
- Multiple categorization test
- Impulsivity test
- Multiple classification task
- Multiple seriation task
- Reversibility task
- Quantity pre-test
- Number pre-test
- Quantity conservation
- Number conservation
- Reading prognosis test*
- Animal house - WPPSI **
- Geometric design - WPPSI **
- Block design - WPPSI **

Post-Test Instruments

- Object-picture categorization test (short form) *†
- Multiple categorization test
- Impulsivity test
- Multiple classification task
- Multiple seriation task
- Reversibility task
- Quantity conservation
- Number conservation
- Reading prognosis test *
- Geometric design - WPPSI **
- Block design - WPPSI **
- Peabody picture vocabulary test **
- Sigel cognitive styles task *

* Protocol not included as results will be reported at a later date.

** Protocol not included as this is a commercially available standardized test.

*† Starred items on long form indicate items included in short form.

Administration of Categorizing Test

Materials:

(In order of presentation to the child)

(1) MATCHES (M)	(2) BLOCKS (Bl)	(3) SPOON (S)	(4) PENCIL (Pe)
(8) NOTEBOOK (NB)	(7) CUP (C)	(6) PIPE (Pi)	(5) TOP (T)
(9) BALL (B)	(10) CIGARETTES (Ci)	(11) CRAYONS (Cr)	(12) BOTTLE OPENER (BO)

A set of colored pictures of these same twelve objects (presented in the same order).

Procedure:

I. Identification Task:

A. Say to the child: I have some things here that I am going to put on the table. Tell me what they are.

The objects (or pictures) are placed in front of the child in the order indicated above, the matches in the upper left hand corner of the child's view. The name that the child uses is written on the answer sheet. If the child cannot give you a name, ask him to describe what it does or how it is used, and record the description. Do not give the child a label if he lacks one. If he gives the correct label you may just make a check mark.

II. Active Sort:

A. Pick out the pencil from the array (leaving the other items in the above order), put it over to the side and say to the child:

a. Look at all these (indicate total array of objects or pictures) and put over here the ones that are the same or like this one.

Circle on the score sheet the items that the child selects, and ask him:

Why are these the same or alike?

Record the answer verbatim, and put an "a." to indicate he responded to Question a.

If the child does not respond to the above (a.) say:

b. *Look at all these and pick out the ones that belong with this one.*

Circle the items he selects and ask:

Why do these belong together?

Record his answer and indicate that he responded to Question b.

If the child does not respond to the above (b.), say:

c. *Put over here the ones that go with this one.*

Circle the items he selects and ask:

Why do these go together?

Record his answer and indicate that he responded to Question c.

B. Return the pencil to the array and repeat the procedure with the ball. Continue this procedure for the 10 remaining items in the following order: Cigarette, crayons, bottle opener, top, pipe, cup, notebook, matches, blocks, spoon. (You will note that the order for the 12 items is upper right to lower left, through the lower right, then middle right to middle left, then upper left to pencil.)

Clarify all vague responses with one of the following probes:

(1) How are they the same? or In what way are they alike?

Use this probe after a response such as "they are alike" or "they are the same." Try to determine the specific reason for the grouping.

(2) Show me or Show me the ones you (that are) ___________.

This probe is used when the child responds "they are straight," "you smoke them," etc., and it is not obvious that the response pertains to all objects grouped. (For example, if the cigarette, pipe and crayons are grouped and the response is "you smoke them," the appropriate probe would be Show me the ones you smoke.)

(3) Tell me more. This general probe can be used to clarify any response the child gives which is not clear to E.

Record verbatim all probes used and all verbal responses given by the child. Also record all actions the child performs while responding (e.g. pointing to parts of objects or pretending to write in the notebook after the pencil has been selected to go with it.)

III. Passive Sort:

After the child is questioned on all twelve pictures (and they are again in the original order), E selects out three items (see score sheet for items and order) and asks:

a. Tell me how these three are the same or alike?

If no response then E asks:

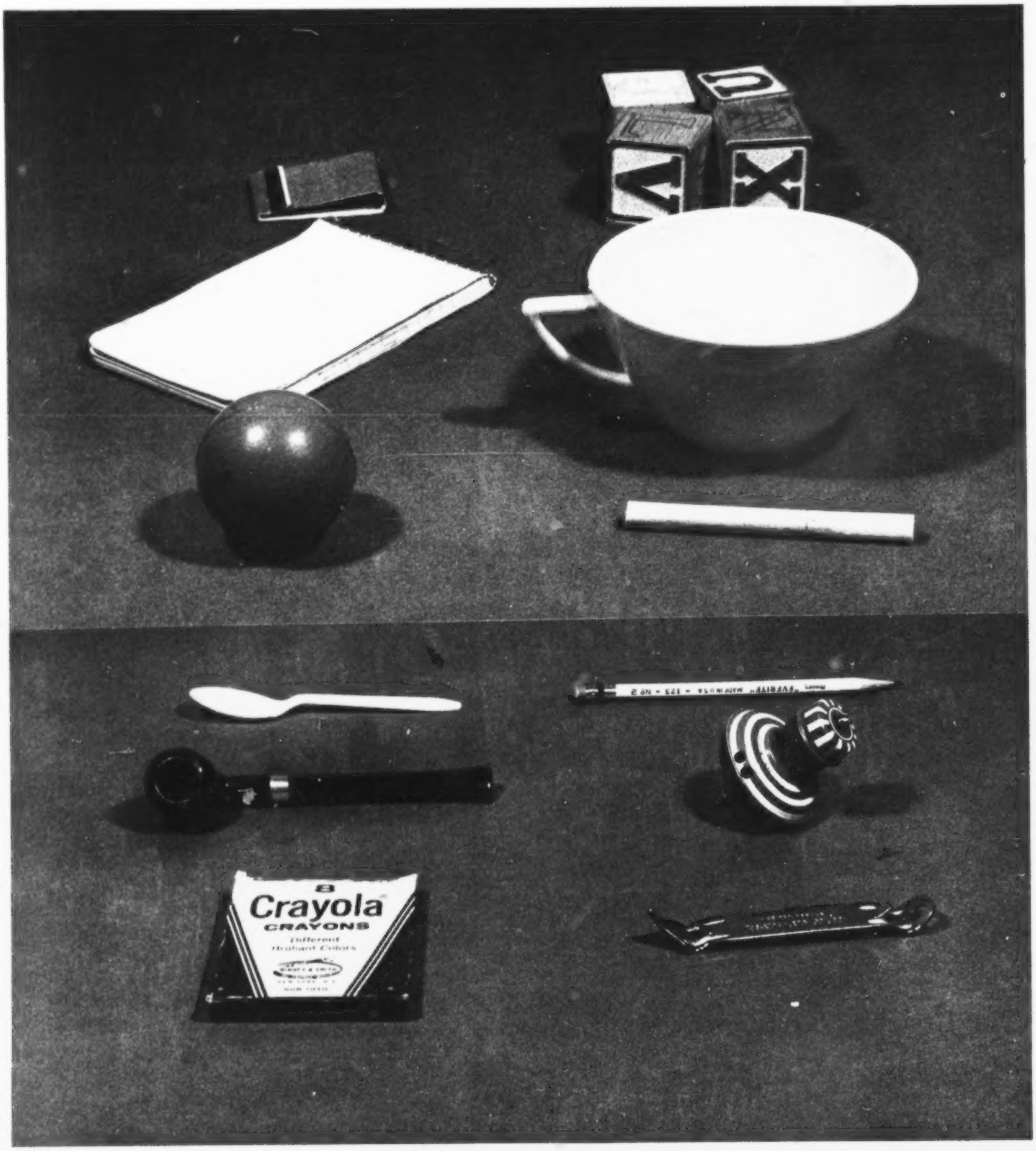
b. Tell me how these three belong together?

If no response then E asks:

c. Why do these three go together?

For each item circle the objects the child includes in his response, record the child's answer verbatim, and indicate to which question he responded. For vague responses use the probes given under the Active Sort.

Fig. 1


8
Crayola
CRAYONS
Different
Brilliant Colors

CATEGORIZATION TEST OBJECTS

COVER SHEET

Name____________________ Birth Date_____ Test Date_____ Session initial repeat________________
(enter A for obj-dolls
B for pict-blks)

School__________________ Teacher_______________ Examiner__________ Head Start____

Testing Remarks:

Categorizing Test

Label:

Matches____

Blocks____

Spoon____

Pencil____

Top____

Pipe____

Cup____

Notebook____

Ball____

Cigarettes____

Crayons____

Bottle Opener____

CATEGORIZING TEST

NAME________________________ SESSION________

LABEL	GROUPING - Act.	INQUIRY
	* condition - Pe. M. Bl. S. Pe. NB. Cu. Pi. T. Ba. Ci. Cr. BO.	
	* condition - Ba. M. Bl. S. Pe. NB. Cu. Pi. T. Ba. Ci. Cr. BO.	
	* condition - Ci. M. Bl. S. Pe. NB. Cu. Pi. T. Ba. Ci. Cr. BO.	
	condition - Cr. M. Bl. S. Pe. NB. Cu. Pi. T. Ba. Ci. Cr. BO.	
	* condition - BO. M. Bl. S. Pe. NB. Cu. Pi. T. Ba. Ci. Cr. BO.	
	condition - T. M. Bl. S. Pe. NB. Cu. Pi. T. Ba. Ci. Cr. BO.	

CATEGORIZING TEST (cont.)

NAME____________________ SESSION__________

LABEL	GROUPING - Act.	INQUIRY
	* condition - Pi. M. Bl. S. Pe. NB. Cu. Pi. T. Ba. Ci. Cr. BO.	
	condition - Cu. M. Bl. S. Pe. NB. Cu. Pi. T. Ba. Ci. Cr. BO.	
	condition - NB. M. Bl. S. Pe. NB. Cu. Pi. T. Ba. Ci. Cr. BO.	
	condition - M. M. Bl. S. Pe. NB. Cu. Pi. T. Ba. Ci. Cr. BO.	
	condition - Bl. M. Bl. S. Pe. NB. Cu. Pi. T. Ba. Ci. Cr. BO.	
	* condition - S. M. Bl. S. Pe. NB. Cu. Pi. T. Ba. Ci. Cr. BO.	

CATEGORIZING TEST

NAME 4 SESSION

GROUPING - Passive	INQUIRY
condition - smoke Pi. Ci. M	
condition - kitchen * Cu. BO. S.	
condition - writing NB. Pe. Cr.	
condition - toys * Ba. Bl. T.	
condition - blue Ba. T. M.	
condition - yellow * Pe. Cr. Cu.	

CATEGORIZING TEST (cont.) NAME____________________ SESSION________

GROUPING - Passive	INQUIRY
condition - white S. Ci. NB.	
condition - long * Pe. Pi. Ci.	
condition - round Ba. T. Cu.	
condition - paper * M. Cr. NB.	
condition - metal * BO. T.	
condition - wood Bl. Pi. Pe.	

HEAD START
1-26-68 (rev.)

Sigel
Olmsted

SCORING MANUAL - CATEGORIZING TEST

General Rules:

(1) Check to make sure that responses are correctly recorded and that the stimulus is not also counted as an item selected.

(2) If two or more responses are given for one group of stimuli, score the one of highest verbal level. If multiple responses are equally good in verbal level, but use different bases of classification, score the first.

(3) If the child initially mislabels an item and consistently uses that label, accept it and score his responses within the context of that label: e.g., if he calls the top a sharpener and selects the pencil to go with it, saying that you sharpen the pencil with it, score as Appropriate R-F. Only initial unusual labels are accepted.

(4) If the child uses a response such as "you buy them in a store," "you play with them," or "God made them," indiscriminately, i.e., for several different groups of items, score the responses as though correct and note that the child is perseverative. This rule applies only when the same vague response is used eight or more times.

Each response made by the subject will be scored for two aspects, the verbal level of the response and the type of classification used.

VERBAL LEVEL

SCORABLE RESPONSES

Grouping Responses:

Grouping responses are those in which a meaningful relationship between all of the items grouped is given. There are three types:

1) Appropriate --All items sorted from the stimulus array must be included in a fully articulated response. A fully articulated response must include a categorical label or the labels of all items included in the sort. A pronoun will be accepted as a substitute for the item label(s) if the referent of the pronoun is unequivocal: e.g., "they are all round," or "they the same color."

If the items are treated separately, but the same, the response is scored as Appropriate: e.g., "this is yellow and this is yellow," or "you play with this and you play with this," or "you eat with the spoon and you eat out of the cup."

When the action attributed to one of the items needs, or is commonly associated with, the presence of the other item(s) for its execution, score as Appropriate since the child has selected these items from the matrix: e.g., "light the cigarette," when the items are the matches and the cigarette.

2) Additional --If the child gives a verbal response which does not fulfill the criteria for full articulation, but through implication expresses a unifying concept, score as an Additional: e.g., "yellow," or "long." Such implications may also be assumed when a single verb represents the function of all the items: e.g., "smoke," or "play."

Also score as Additional, responses where the basis of classification is indicated manually: i.e., no verbal response but the child points (→) to blue parts on all of the objects selected.
Note: When gestures accompany a fully articulated response: e.g., "they are all blue" and the child points to blue parts of the items selected, score as Appropriate as the gestures are redundant with the verbal response.

3) Labeling Error --Here the child has grouped items which are, in fact, similar, but gives the incorrect label for the grouping: e.g., puts blue items together and says, "they are all yellow."

Nongrouping Responses:

Nongrouping responses are those in which an answer is given and its meaning is clear but it does not meet the task requirements. There are five types:

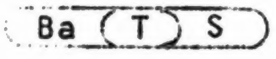
1) Partial and Disjunctive 2 --In a partial, one grouping response is given but includes only some (two or more) of the items selected: e.g., "this (→Ba) is blue and this (→T) is blue," when the items are the ball, top, and spoon.

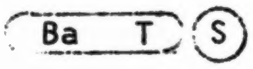
(Ba T) S

If it is not clear which items are referred to in the grouping response, a probe should have been used.

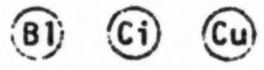
If in response to the probe the child indicates the inclusion of only some of the items, score as a Partial. See Appendix 3.

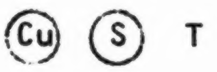
DJ2s are responses which consist of two or more smaller groupings of the items chosed: e.g., (1) "these are blue (—>Ba and T) and these are white (—>T and S)," and (2) "these are blue (—>Ba and T) and this (—>S) is white."

(1)


(2)


2) Disjunctive 1 --Here the child assigns a different attribute, use, or owner to each of at least two objects picked: e.g., (1) "you play with the blocks, smoke a cigarette and drink from the cup," or (2) "this (—>Cu) is yellow and this (—>S) is white," when the items are the cup, spoon and top.

(1)


(2)


When the items have a common cultural usage, e.g., cup and spoon, but the verbal responses clearly indicate a separate function: e.g., "you drink with the cup and eat with the spoon," then the response is not scored as Appropriate, but as Disjunctive 1.

Also, responses which show an associative difference between two or more items should be coded as DJ1: e.g., "these (—>Ba and T) are blue and this (—>Cu) is not blue," or "this is taller than that," or "they are not the same color."

3) Single Associations --Single associations are responses in which the subject gives a reasonable association to just one item selected: e.g., "you write with the pencil," when the stimuli are the pencil, the pipe and the cigarette.

4) Grouping Error --Here the child has grouped items which are different but gives them a common label: e.g., "they are all blue," when the items are the ball, the top and the cup.

5) Irrelevant and Idiosyncratic --These responses include such things as:
   (1) color responses using the backgrounds or shadows of the stimuli;
   (2) form or structure responses referring to the shape or to properties of the pictures themselves: e.g.; "they are square," and child points to edges of pictures, or "they have points," and subject points to corners of pictures;
   (3) contextual groupings which are merely piling: e.g., "put the ball in the cup," or "put the pipe on the blocks;" and
   (4) thematic responses where the items are related in a story but not in any meaningful way: e.g., "the ball and the cup are going for a ride."

NONSCORABLE RESPONSES

Nonscorable responses are those in which an answer is not given or is not clear enough to score. There are two types:

1) Insufficient Information --This category includes the following:
   (1) subject merely names the objects,
   (2) subject says, "I don't know," and
   (3) subject merely repeats or paraphrase the question, e.g., "they are the same," or "they belong together."

2) No Choice --The subject selects no item to go with the stimulus. (This response can only occur in the Active section of the test.)

CLASSIFICATION

All scorable (grouping and nongrouping) responses of the child are scored in one of the three following categories:

1) Descriptive

   form --The use of measurement or shape properties, such as round, flat, long, small, fat, corners, is scored as a form response: e.g., "they are all long." (See Appendix 1.)

   color --Use of a color label, or saying "same color" is scored as a color response.

structure --Designation of specific intrinsic or inherent parts or properties such as metal, wood, having writing on them; having similar parts like handles, knobs, points, etc., is a structure response.

2) Relational Contextual

functional --When the action of the functional-relation takes place directly between the items in a given sort, then the response is recorded as relational-functional: e.g., "light the cigarette with the matches."

Also, functions taking place between a person and single items in a given sort are scored as relational-functional: e.g., "write with the pencil and smoke the cigarette."

thematic --When the action between two or more items in a given sort takes place on an imported item, then the response is recorded as relational-thematic: e.g., "open the pop with the bottle opener and drink it out of the cup."

Also code as thematic those responses in which the objects are related in story sequence but their function is not otherwise interrelated: e.g., "smoke a cigarette while you drink a cup of coffee."

Thematic responses can also occur with single items: e.g., "you get up in the morning and drink juice in the cup," when the items are the cup, the crayons and the pencil.

contextual --Responses in which objects are grouped because they are found in the same location, or belong to the same person are scored contextual: e.g., "my daddy has those," or "they are in the kitchen."

Contextual responses can also occur with single items: e.g., "this goes in the kitchen," when the items are the bottle opener and the top and child points to BO.

3) Categorical

low functional--One object or picture is related to the stimulus because both are used for the same purpose: e.g., "you write with them," or "you play with them," or inferred action properties such as rolling or spinning.

high functional--Two or more objects or pictures are chosen to go with the stimulus because all are used for the same purpose or inferred action properties such as rolling or spinning.

class label --One term is used to define two or more items included in the class: e.g., "toys," or "kitchen things," or "writing things."

This response can also be used with single items: e.g., "this (→T) is a toy," when the objects are the top and the bottle opener.

All nonscorable responses are scored as having no classification ("None" category on the score sheet.)

APPENDIX 1

Descriptive-Form:

The following adjectives are considered to accurately describe the form of the object:

Matches..................Flat,* straight, square, corners

Blocks...................Flat,* straight, square, corners,**round, fat***

Spoon....................Flat *(handle), straight (handle), round (bowl)

Pencil...................Long, round, straight, pointed, flat*

Top......................Round, fat

Pipe.....................Round, flat,* straight, long

Cup......................Round, fat

Notebook.................Flat,* square, corners, straight, long

Ball.....................Round, fat

Cigarettes...............Round, long, straight, flat*

Crayons..................Flat,* square, corners, long, straight

Bottle opener............Flat,* long, pointed, straight, round

*Flat may be taken to mean either:
a) a flat surface, or
b) a lack of height

Pointing is necessary to indicate flatness meaning resting on a surface.

**Pointing to the round letters on the blocks is necessary to indicate roundness.

***Fat may be taken to mean massive or having height and width.

APPENDIX 2

Sample Responses

SCORE	CODE	ITEMS	RESPONSE
App -Fo	01	Pe,Ci	They are long
App -Co	02	Cu,Pe,Cr	They are the same color
App -Co	02	Cu,Pe,Cr	They yellow
App -Co	02	Cu,Pe,Cr	All are yellow
App -Co	02	Cu,Pe,Cr	This yellow (→Cu), this yellow (→Pe), and this yellow (→Cr)
App -St	03	Pi,BO	They have metal on them
App -R-F	04	Pi,M	You light the pipe
App -R-F	04	Pe,NB	Write in here (→NB) with this (→Pe)
App -Th	05	Cu,S	You put coffee in the cup and drink it with the spoon
App -Cont	06	Ba,Bl	My brother has these
App -LF	07	Cu,S	You drink coffee with them
App -LF	07	NB,Pe	You write in the NB and you write with the Pe
App -HF	08	T,Ba,Bl	You play with them
App -CL	09	T,Ba,Bl	They are toys
Add -Fo	11	Ba,Pi,Ci	All of these have this (traces circular edge of cup with finger)
Add -Fo	11	Pe,Ci	Long
Add -Co	12	Cu,Pe,Cr	Yellow
Add -Co	12	Cu,Pe,Cr	Same color
Add -Co	12	Cu,Pe,Cr	(→yellow parts on each)
Add -Co	12	Cu,Pe,Cr	This (→Cu) has this color (Pe), this (→Pe) has this color (→yellow on crayons) and this (→Cr) has this color (→Cu)
Add -St	13	BO,Pi	(→metal parts on each)
Add -R-F	14	Pe,NB	(Pretends to write in NB with Pe)
Add -LF	17	Ci,Pi	(Pretends to smoke each one)
LE -Fo	21	Ba,T	They are square
LE -Co	22	Cu,Pe	Blue
LE -St	23	Cu,S	They are wood
Part-Fo	31	Ba,Cu,Ci	This (→Ba) is round and this (→Cu) is round
DJ2 -Co	32	Ba,T,S	This (→Ba) and this (→T) are blue and this (→T) and this (→S) are white

APPENDIX 2
(continued)

SCORE	CODE	ITEMS	RESPONSE
DJ2 -St	33	Ba,Cu,S	These (→Cu and S) are plastic and this (→Ba) is round
DJ2 -R-F	34	Ci,Pi,M	You light the Ci with the M and you light the Pi with the M
DJ2 -Th	35	T,BO,Cu	You open pop with this (→BO) and pour it in the cup and this (→T) is a toy
Part-Cont	36	Cu,BO,S	This (→Cu) and this (→S) go in the kitchen
DJ2 -LF	37	NB,Cr,Pe	You write with these (→Cr and Pe) and these (→Cr and NB) are square
Part-HF	38	Ci,Pi,M,T	You smoke with this (→Ci) and this (→Pi) and this (→M)
DJ2 -HF	38	Pe,Cr,NB,M	You write with these (Pe,Cr,NB) and these are square (Cr,NB,M)
DJ2 -CL	39	T,BO,Cu	This (→T) is a toy and you open pop with this (→BO) and pour it in the cup
DJ1 -Fo	41	Cu,Ci,Cr	This one (Cu) is round and this one (Cr) is square
DJ1 -Co	42	Ci,M	This one (M) is blue and this one (Ci) is not blue
DJ1 -Co	42	Ci,M	This (Ci) is white and this (M) is blue
DJ1 -Co	42	Ci,M	They aren't the same color
DJ1 -St	43	Cu,S,BO	These (Cu and S) are plastic and this one isn't
DJ1 -R-F	44	NB,M	You write in this (NB) and this (M) is blue
DJ1 -Th	45	Pe,Ci	When you go to school you write your name on your paper with this one (Pe) and you supposed to smoke this one
DJ1 -Cont	46	BO,T	Cause this one (BO) goes in the kitchen and play with the top
DJ1 -CL	49	Ba,Cu	This one (Ba) is a toy and you drink out of the cup
SA -Fo	51	NB,Pe,Cr	This (NB) is square
SA -Co	52	Ci,M	This (Ci) is white
SA -St	53	NB,Pe,Cr	This one (Pe) has a point
SA -R-F	54	S,Ci,NB	You eat with this one (S)
SA -Th	55	Pe,Ci	When you go to school you write your name on your papers
SA -Cont	56	BO,T	Cause this one (BO) goes in the kitchen
SA -CL	59	Ba,Cu,Cr	This is a toy (→Ba)
GE -Fo	61	Ba,NB,Ci	They are all square
GE -Co	62	Ba,T,S	They are all blue
GE -St	63	Ba,Cu,T	They all have points

APPENDIX 2
(continued)

SCORE	CODE	ITEMS	RESPONSE
GE -R-F	64	S,NB	You write in here (NB) with this (S)
GE -Th	65	BO,T	You open pop with this (BO), pour it in the T and drink it
GE -Cont	66	M,Cr,NB	Cause you put these in your desk at school
GE -LF	67	BO,T	You eat with these
GE -HF	68	Pe,Pi,Ci	You smoke with all of these
GE -CL	69	Pe,Pi,Ci	These are smoking things
IrId-Fo	71	Pe,Ci	This is square and this is square (→shape of the pictures)
IrId-Co	72	Ci,Cr	This is brown and this is brown (→background of each picture)
IrId-St	73	Cu,S	These have points(→corners of pictures)
IrId-R-F	74	M,Ba	You take the matches and burn that (Ba) up
IrId-Th	75	Pe,Cr,NB	The Pe and Cr went downtown to buy a birthday present for the NB
IrId-Cont	76	Ba,Bl	Put the ball on the blocks
InIn-None	80	Pe,Cr	This is a pencil and these are crayons
InIn-None	80	Pe,Cr	I don't know
InIn-None	80	Pe,Cr	They are the same
NC -None	90	Pe	(Subject selects no item to go with the pencil)

APPENDIX 3

Examples with Probes

ITEMS	RESPONSE	PROBE
Ba,Cu,NB	"These are round"	Show me the round ones

RESPONSE TO PROBE	SCORE	CODE
No response	GE-Fo	61
Points to all three	GE-Fo	61
Points to Ba and Cu	Part-Fo	31

ITEMS	RESPONSE	PROBE
Cu,Pe,Ba	"They are yellow"	Show me the yellow ones

RESPONSE TO PROBE	SCORE	CODE
No response	GE-Co	62
Points to all three	GE-Co	62
Points to Cu and Pe	Part-Co	32

ITEMS	RESPONSE	PROBE
NB,Cr,Pe	"You can write on that"	Can you tell me more

RESPONSE TO PROBE	SCORE	CODE
No response	App-R-F	04
You write on this (—>NB) with this (—>Pe)	Part-R-F	34
You write on this (—>NB) with this (—>Pe), and you write on this (—>NB) with this (—>Cr)	DJ2-R-F	34
You write with these (—>Pe,Cr) on that (—>NB)	App-R-F	04
You write on that (—>NB) and you write with this (>Pe)	Part-LF	37
You write with them (—>Pe,NB,Cr)	App-HF	08

APPENDIX 3
(continued)

ITEMS	RESPONSE	PROBE
Cu,S,BO	"Drink coffee"	Show me the ones you drink coffee with

RESPONSE TO PROBE	SCORE	CODE
No response	GE-HF	68
Points to all three	GE-HF	68
Points to Cu and S	Part-LF	37
Pour coffee in cup, open can of milk with BO, pour it in cup and stir it with the spoon.	App-Th	05

NAME__________ SUBJ.NO.__________ HEAD START__________ CONDITION: OBJ.____ PICT.____

SCHOOL__________ EXAMINER__________ NON HEAD START__________ TEST: ACTIVE___ PASSIVE___

RACE: N______ W______ CODER__________ SESSION: PRE____ POST____

SEX: MALE____ FEMALE____

			A-Verbal Level										B-Classification									
			Grouping			Non-Grouping					NS			Descrip			Rel-Cont			Categor		
PASSIVE	ACTIVE	Trial No.	Appropriate	Additional	Labeling Erro	Part.& Disj.2	Disjunctive 1	Single Assoc.	Grouping Er.	Irrel.& Idio.	Insuf. Info.	No Choice	None	Form	Color	Structure	Functional	Thematic	Contextual	Low Function.	High Function	Class Label
Pi. Ci. M.	123456789 10 10 12	1	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	78	8	9
Cu. BO. S.	123456780 10 11 12	2	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
NB. Pe. Cr.	123456789 10 11 12	3	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
Ba. Bl. T.	123456789 10 11 12	4	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
Ba. T. M.	123456789 10 11 12	5	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
Pe. Cr. Cu.	123456789 10 11 12	6	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
S. Ci. NB.	123456789 10 11 12	7	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
Pe. Pi. Ci.	123456789 10 11 12	8	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
Ba. T. Cu.	123456789 10 11 12	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
M. Cr. NB.	123456789 10 11 12	10	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
BO. T.	123456789 10 11 12	11	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
Bl. Pi. Pe.	123456789 10 11 12	12	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
		Σ																				

Administration Procedure -- Multiple Categorization Test

MATERIALS:

Set of twelve colored pictures from the Sigel Categorization Test.

PROCEDURE:

E selects out two (or three) items (see protocol for items and order) and asks:

a. Tell me how these two are the same or alike?

If no response then E asks:

b. Tell me how these two belong together?

If no response then E asks:

c. Why do these two go together?

Then say:

Now tell me another way that they (are alike or the same; belong together; go together).

Record the second answer as a', b', or c' and the third answer as a'', b'', or c''.

Continue until the child has given two bases of categorization for items 1 through 6 and three bases for items 7 through 12.

For each answer to each item circle the objects the child includes in his response, record the child's answer verbatim, and indicate to which question he responded. For vague responses use the probes given in the Categorization Test instructions.

Head Start
9-26-67

Sigel
Olmsted

Categorizing Test -- Multiple Classification

Name ______________________ Date _____

Grouping	Inquiry -- Two Ways
Ci, Pi	
Ci, Pi	
NB, Cr	
NB, Cr	
Cu, S	
Cu, S	
Ba, Bl, T	
Ba, Bl, T	
NB, Ci, S	
NB, Ci, S	
Bl, NB, Ci	
Bl, NB, Ci	

Categorization Test -- Multiple Classification

Name______________________________ Date _____

Grouping	Inquiry -- Three Ways
Ba, T Ba, T Ba, T	
Pe, Cr Pe, Cr Pe, Cr	
S, BO S, BO S, BO	
M, NB, Cr M, NB, Cr M, NB, Cr	
NB, Pe, Cr NB, Pe, Cr NB, Pe, Cr	
Bl, Cr, Pe Bl, Cr, Pe Bl, Cr, Pe	

Impulsivity Test Administration

Remove the two lined sheets from the protocol. Present the child with one. Make sure that the child is sitting straight up to the table. Place the sheet in front of him with the line running parallel to the side he is facing. Have the child put his crayon at the top center of the page and then read these directions:

> When I say start, I want you to draw a line down to this line (point to center of paper) as slowly as you can. Go very slowly Ready? Start.

Do not start the child until he is set with his crayon and you are sure he understands what to do. If there are any questions, repeat the above directions verbatim.

Time from the word "start" until his crayon touches the line. Record the time and duplicate the procedure on the second page, saying:

> All right. Now we'll do it once more. Remember to go very slowly. Ready? Start.

Write the child's name and the time for each test on the correct sheets after the test session. Number the sheets in the order in which they were presented.

INSTRUCTIONS FOR ADMINISTRATION OF LOGICAL OPERATIONS AND CONSERVATION

MULTIPLE CLASSIFICATION

The task requires that S fill one empty cell of a four-cell matrix with a picture that includes both subclass attributes relevant to the matrix.

Present the matrices one at a time to S in the following order: clocks (practice trial), pitchers, apples, trees. The first three items are to be administered to all Ss, the fourth task presented only if S passes either the second or the third matrix. Verbatim instructions are included on the protocol. First have S tell you about the picture and then ask him to select the picture he thinks will best complete the matrix. Record his choice and select two other pictures for S to accept or reject as adequate to complete the matrix. If S accepts either or both of the alternatives as adequate, ask which of the four pictures he thinks is the "very best" to complete the task. Record all probes and verbalizations verbatim. The criterion for passing Multiple Classification is two of three trials correct.

MULTIPLE SERIATION

The task requires that S fill in one empty cell on a strip of four cells with a picture that includes both values of two continuous dimensions from which the strip is constructed.

Present the strips one at a time to S in the following order: Leaves (practice trial), bottles, tulips, houses. The first three items are to be presented to all Ss, the fourth task administered only if S passes either the second or the third strip. Verbatim instructions are included on the protocol. First, have S tell you about the figures and then ask him to select the alternative he thinks will best complete the strip. Record his choice and select two other pictures for S to accept or reject as adequate to complete the strip. If S accepts either or both of the alternatives, ask which of the four pictures he thinks is the "very best" to complete the strip. Record all verbalizations verbatim. The criterion for passing Multiple Seriation is two of three trials correct.

REVERSIBILITY

The task requires S to insert a missing picture in a series of pictures which are reversed horizontally from a standard series.

Present the series one at a time to S in the following sequence, colors (practice trial), fruit, geometric shapes, animals. The first three trials are to be administered to all Ss, the fourth task being used only if S passes either the second or the third item. Verbatim instructions are included on the response sheet. Arrange the standard set (E's set) in one holder with the red (raspberries, triangle, duck) on the child's left and the green (elderberries, right angle, dog) on the child's right. Then arrange the variable set (S's set) in the reverse order in the other holder omitting the card designated in the instructions (brown, pineapple, diamond, pig). Hand the fifth card to S and ask him to insert it in his set in the place it belongs to make his set look like your set if your set were turned around. Record S's response as right or wrong and place a check on the protocol to show where he inserted the card. Record all verbalizations verbatim. The criterion for passing Reversibility is two of three trials correct.

PRIMARY PRETEST

This task is designed to determine whether Ss can correctly label relations between objects with the words, "same," "more," and "less." Two types of content will be used, continuous quantity employing vials of liquid, and number utilizing different numbers of pencils. For each type of content a standard object and three comparisons will be used: one being an upward comparison ("more"), one a downward comparison ("less"), and the third the same as the standard ("same").

Administer the tests in the following order: (1) quantity, and (2) number, giving the comparisons in the sequence presented on the protocols. Verbatim instructions are given on the protocols. Place the standard on the S's left and the comparison on S's right and ask question A. If S uses the correct relevant word (indicated next to the trial number) go on to the next trial. If S does not use the correct relevant word continue with the sequence of questions given on the protocol. With questions D and E vary the sequence of the terms "more," "same," and "less" over trials. Terminate the trial when S correctly uses the relevant term, except that a correct answer to question B requires continued testing until S responds correctly to C, D, or E. In cases of ambiguity, continue the series of questions until you decide that S has given a complete and correct response. Never give S any indication of the correctness of his response. The criterion for passing the Primary Pretest is correct responses to at least three of the four "more" and "same" comparisons.

CONSERVATION

Conservation requires that the child come to the logically necessary conclusion that a criterial property such as number of objects remains unchanged even though there is obvious change in some related property, such as the length of line of objects or the shape of the objects. That is, as long as nothing has been added or taken away, the number of objects is maintained or conserved.

Present the conservation tasks in the following order: (1) quantity and (2) number, giving the comparisons in the order presented on the protocols. The first two trials are to be presented to every S, the third trial administered only if S passes either the first or the second trial. If two of three trials are passed, administer the "check" given at the bottom of the protocol. Verbatim instructions are given on the protocols. For each trial ask S whether there is the "same" amount (number) or "more." Record his answer. (More:V = child says variable has more. More:S = child says standard has more. DK = don't know.) Ask his reason for this answer and record it verbatim. Clarify vague responses by using the general probes Tell me more or Why? Record all probes and responses verbatim. Never inform S of the adequacy of any of his responses. The scoring criteria for the verbal responses in the Conservation tasks are presented in Shantz and Sigel (1967).

MULTIPLE CLASSIFICATION

Name________________________________

(1) PRACTICE: CLOCKS (CS)

a. "Let's look at these things. Tell me about them."________________

____

b. "Yes, this one (1) is a big yellow clock, and this one (2) is a little, yellow clock and this one (3) is a big blue clock. Now, there's nothing in this space. Let's figure out what the one would be like to fit in this space--so it would fit this way (horizontally) and this way (vertically). Here are some to look at; you find the very best one--the one that belongs here."

Choice:____Reason:________________________________

"This (small blue block) is the very best choice because its blue like this one (3) and small like this one (2) so it fits this way (horizontally) and this way (vertically)."

(2) PITCHERS (OE)

Description:________________________________

Choice:____Reason:________________________________

Probe:__/__Reason:________________________________

Probe:__/__Reason:________________________________

Best:__/__

(3) APPLES (NC)

Description:________________________________

Choice:____Reason:________________________________

Probe:__/__Reason:________________________________

Probe:__/__Reason:________________________________

Best:__/__

(4) TREES (SB)

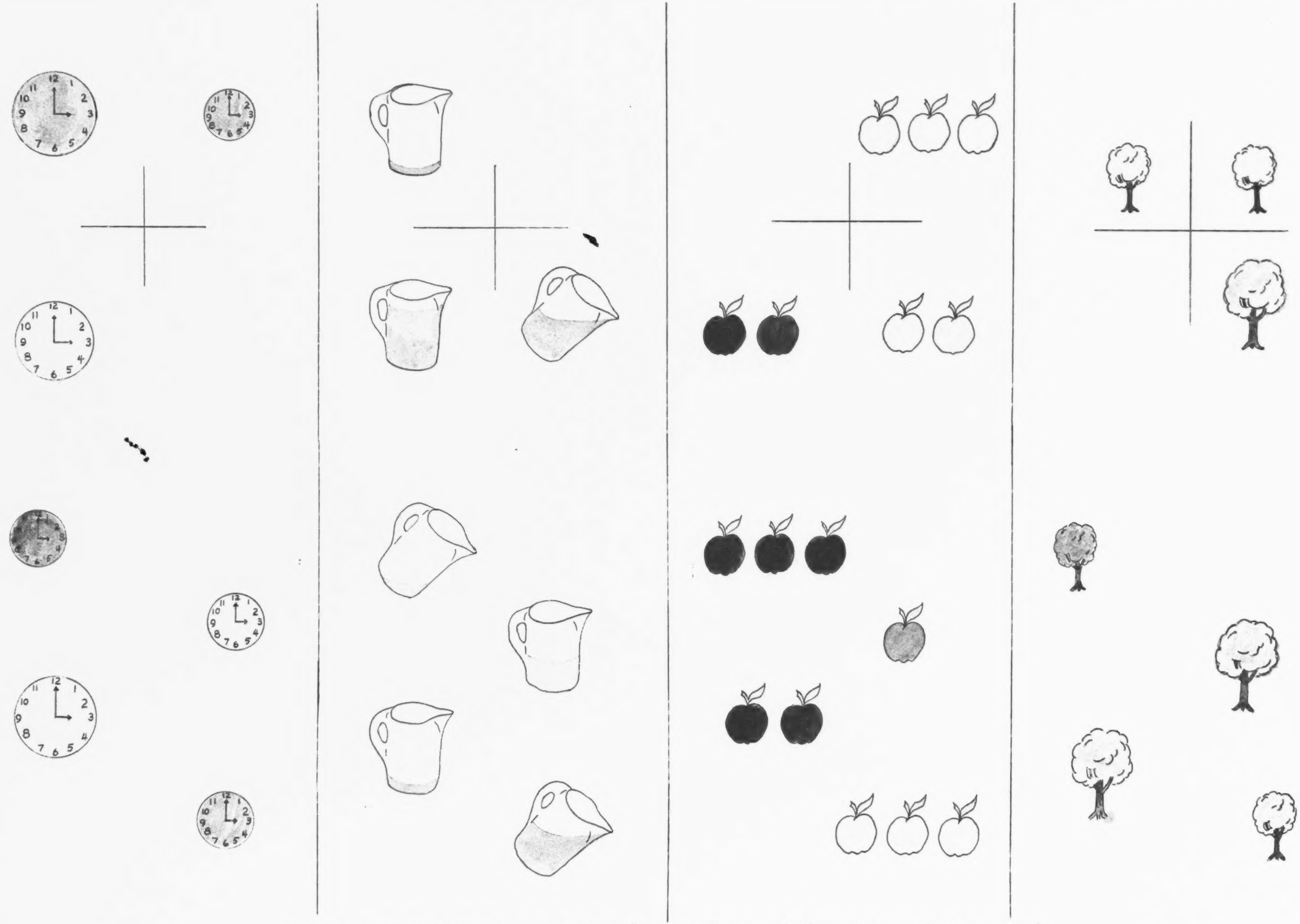
Description:________________________________

Choice:____Reason:________________________________

Probe:__/__Reason:________________________________

Probe:__/__Reason:________________________________

Best:__/__



Multiple classification matrices (top row) and choice sheets (bottom row).

Name____________________________________

(1) PRACTICE: LEAVES (CS)

a. "Let's look at these things. Tell me about them."____________________

____

b. "Yes, this one (1) is a big light green leaf, and this one is empty, and the next one (3) is a small dark green leaf, and this one is a tiny, very dark green leaf. The leaves are getting darker and smaller, aren't they? Now let's figure out which one would fit right in the empty place--it would come next after this one and before this one. Here are some to look at; you find the very best one to fit right in here."

Choice:_____Reason:____

"This (middle size, green leaf) is the very best choice because it is a little smaller and a little darker than this one (1) and yet it is a little bigger and lighter green than this one (3)."

(2) BOTTLES (OE)

Description:____

Choice:_____Reason:____

Probe:__/___Reason:____

Probe:__/___Reason:____

Best:__/___

(3) FLOWERS (NC)

Description:____

Choice:_____Reason:____

Probe:__/___Reason:____

Probe:__/___Reason:____

Best:__/___

(4) HOUSES (SB)

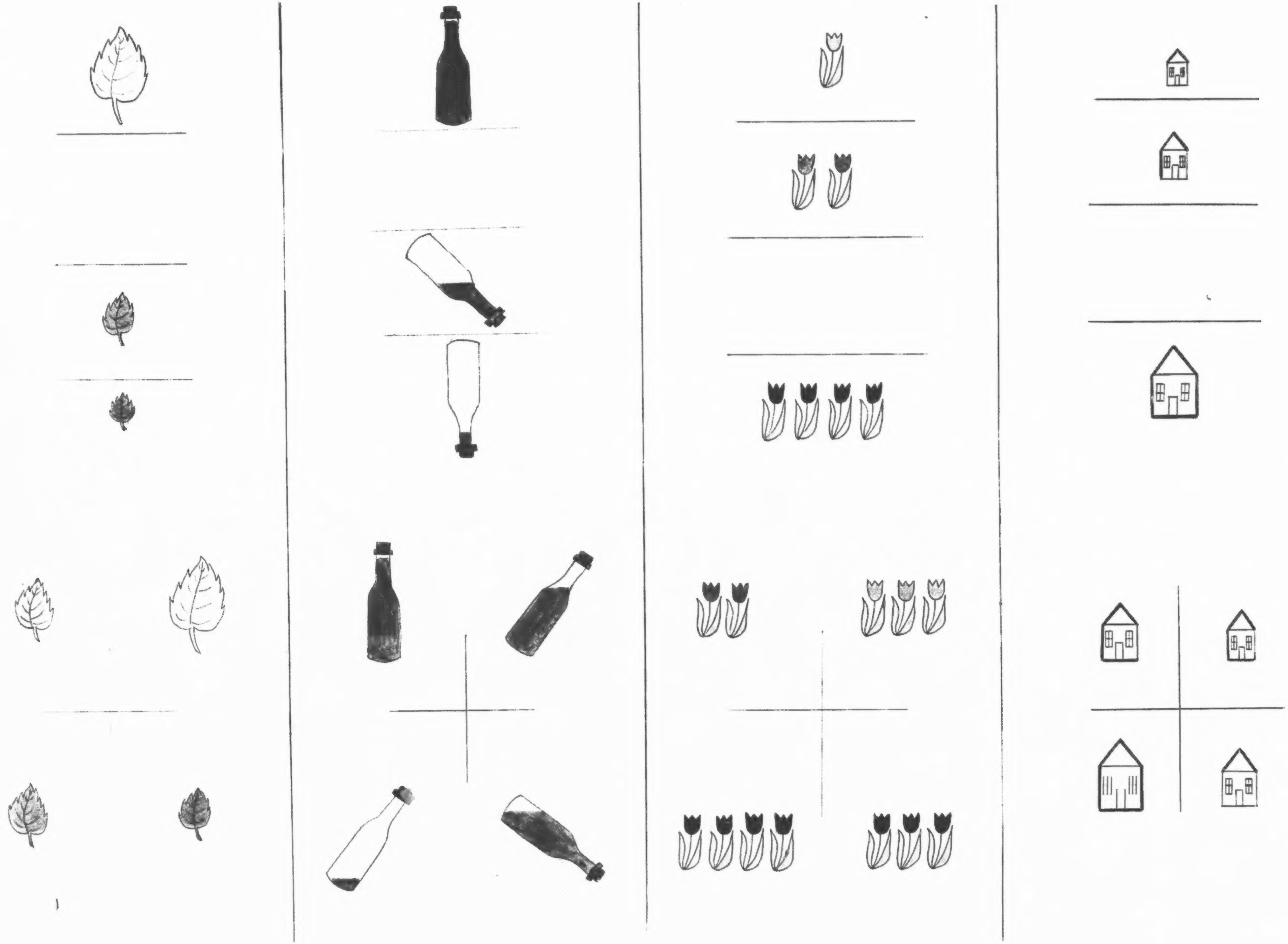
Description:____

Choice:_____Reason:____

Probe:__/___Reason:____

Probe:__/___Reason:____

Best:__/___



Multiplication seriation strips (top row) and choice sheets (bottom row).

REVERSIBILITY

NAME________________________________

(1) PRACTICE: COLORS
"Look at this set of colors. First comes the red, then the blue, then the yellow, then brown, and then the green. Watch! I turn the colors around so the green is first, then brown, then yellow, then blue and the red is last this time. Now I am going to turn the colors back to the way they were before. Here is another set of the same colors with the green first and the red last like it was before when we turned the colors. The BROWN is missing. I want you to put the brown in the place where it belongs so that these colors will look like these colors (point to standard) if those were turned around."

Variable set: E's view

RED BLUE YELLOW . GREEN R W

"You see the brown should go between the green and the yellow so that all the colors are in the same order when I turn these other colors around. First, greens, then browns, then yellows, then blues, and the reds are last.

(2) FRUIT "Look at this set of fruit. Here, first are raspberries, then pineapples. then cherries, then plums, and last elderberries. Here is another set of the same fruit but the elderberries are first and the raspberries are last. The pineapple is missing. Now you have to put the pineapple in the place where it belongs so that these fruit will look like those fruit (pt. to standard) if those were turned around."

Variable set: E's view

RASPBERRIES . CHERRIES PLUMS ELDERBERRIES R W

(3) SHAPES "Look at this set of shapes. Here, first is a triangle, then a circle, then a square, then a diamond, and last a right angle. Here is another set of the same shapes but the right angle is first and the triangle is last. The diamond is missing. Now you have to put the diamond in the place where it belongs so that these shapes will look like those shapes (pt. to standard) if those shapes were turned around."

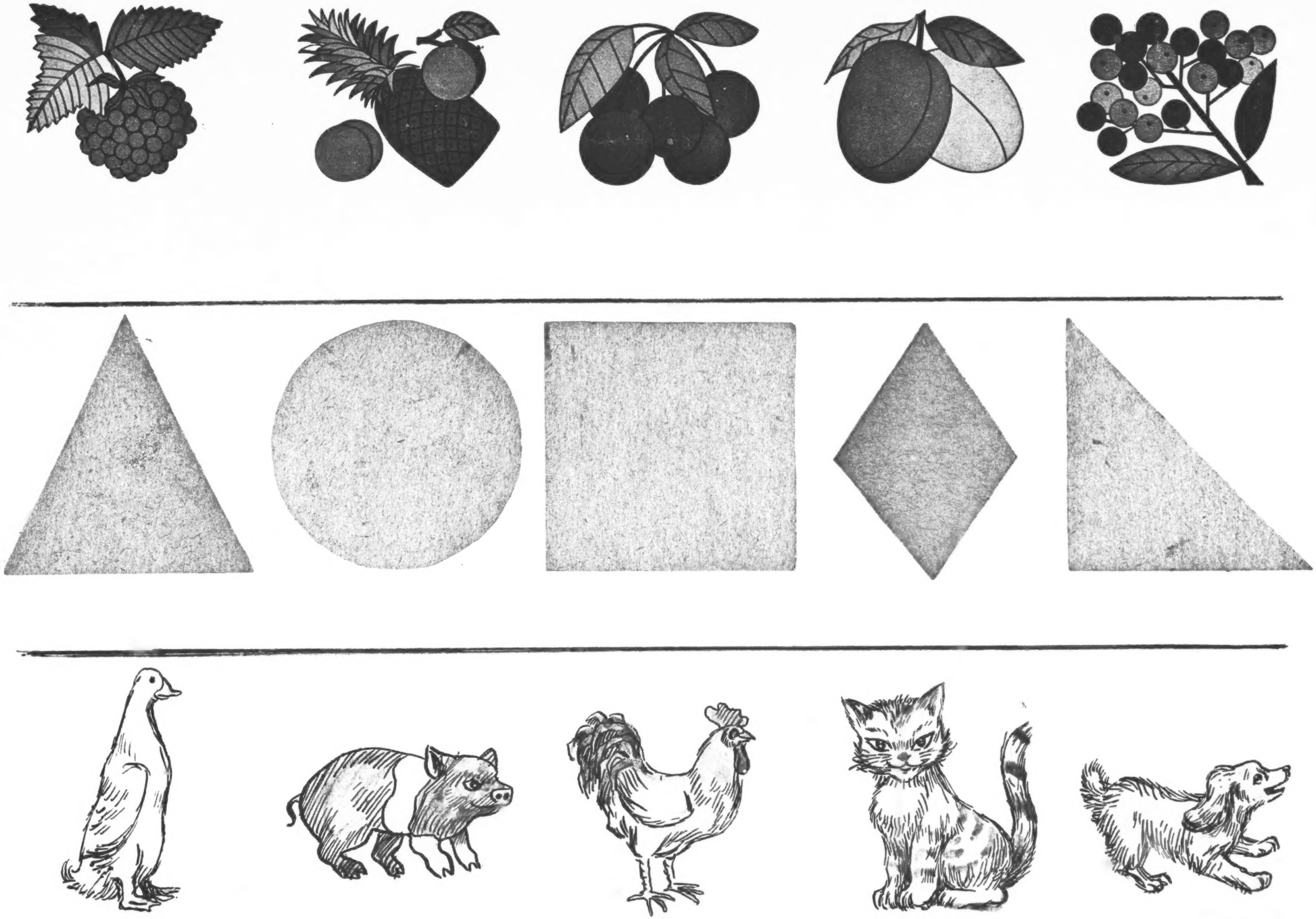
Variable set: E's view

TRIANGLE CIRCLE SQUARE . RIGHT ANGLE R W

(4) ANIMALS "Look at this set of animals. Here, first is a duck, then a pig, then a chicken, then a cat, and last a dog. Here is another set of the same animals but the dog is first and the duck is last. The pig is missing. Now you have to put the pig in the place where it belongs so that these animals will look like those animals (pt. to standard) if those animals were turned around."

Variable set: E's view

DUCK . CHICKEN CAT DOG R W



Reversibility tasks (practice task not included).

Number Pretest (Pencils)

Name ______________________

N.B. Relational response to Step A eliminates steps B, C, D, E.

Order

____ 1. Four Pencils (More)

A. Initial question: "What can you tell me about these?"

B. "Are they the same or are they different?"

C. "How are they the same?" (How are they different?)

D. "Are there more pencils, less pencils, or the same number of pencils here (point to comparison set) as here (point to standard set)?"

More Less Same Don't know

E. "Point to the one that has less pencils; point to the one that has more pencils; do they have the same number of pencils?"

____

____ 2. Two Pencils (Less)

A. Initial question:

B. Same Different

C. How

D. "Are there more...same...less..."

More Less Same Don't know

E. Point, etc. ____

____ 3. Three Pencils (Same)

A. Initial question:

B. Same Different

C. How

D. "Are there the same...more...less..."

More Less Same Don't know

E. Point, etc. ____

Quantity Conservation

Name ____________________________

Present two clay balls to S. "Do these have the same amount of clay?" (If S says no, follow his suggestions of how to make them the same. If all else fails, tell him they have the same amount.) "Now watch."

1. Cup (change one ball into a cup shape)

   a. "Do these have the same amount of clay or does one have more clay?"

   SAME　　MORE: V　　MORE: S　　DK

   b. "Why do you think so?" ____________________________

   ____

Get new set of balls; place balls near each other and establish equality.

2. Pancake (change one ball into a pancake) "Does...more...same?"

   a. SAME　　MORE: V　　MORE: S　　DK

   b. Why: ____________________________

   ____

Establish equality between first set of balls.

3. Hot Dog (change one ball into a hot dog) "Do...same...more?"

   a. SAME　　MORE: V　　MORE: S　　DK

   b. Why: ____________________________

   ____

Change hot dog back into a ball, place next to other ball and establish equality between them.

4. Check

   Remove a chunk from one ball. "Watch what I do. Do these have the same amount of clay or does one have more?"

   a. SAME　　MORE: V　　MORE: S　　DK

   b. Why: ____________________________

Number Conservation

Name ______________________________

Present 12 blue and 12 white chips. "Here are some colored playing chips. Some of them are blue and some of them are white. You take the white ones and I'll take the blue ones...and...let's line them up one at a time in front of us." (Complete one-to-one correspondence.)

"Are there the same number of blue chips as white chips?"

1. Compress blue line (resulting in one 'open' white chip at each end of the white line)

   a. "Are there the same number of white chips and blue chips...or...does one have more chips?"

SAME	MORE B (V)	MORE W (S)	DK
	LESS B (V)	LESS W (S)	

   "Why do you think so?" ______________________________

   ____

2. Scramble white line

   a. "Does one color have more chips...or...are there the same number of white and blue chips?"

SAME	MORE B (S)	MORE W (V)	DK
	LESS B (S)	LESS W (V)	

   b. "Why do you think so?" ______________________________

   ____

3. Extend blue line (resulting in one 'open' blue chip at each end of blue line)

   a. "Are there the same number of white chips and blue chips...or...does one have more chips?"

SAME	MORE B (V)	MORE W (S)	
	LESS B (V)	LESS W (S)	DK

   b. "Why do you think so?" ______________________________

   ____

4. Check: "Watch what I do." (Remove a white chip from the middle)

   a. "Are there the same number of white and blue chips...or...does one color have more chips?"

SAME	MORE B (S)	MORE W (V)	
	LESS B (S)	LESS W (V)	DK

   b. "Why do you think so?" ______________________________

   ____